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ABSTRACT

An anthology of papers for consideration by delegates to the 14th and 15th conferences of the United States National Commission for UNESCO are presented in this book. As a wide-ranging collection of ideas, it is intended to serve as background materials for the conference theme - our responsibility for preserving and defending a human environment that permits the full growth of man, physical, cultural, and social. Thirty-four essays are contributed by prominent authors, educators, historians, ecologists, biologists, anthropologists, architects, editors, and others. Subjects deal with the many facets of ecology and the environment; causes, effects, and interactions with man which have led to the crises of today. They look at what is happening to man's "inside environment" in contrast to the physical or outside environment as it pertains to pollution of the air, water, and land. For the common good of preserving the only means for man's survival, the need for world cooperation and understanding is emphatically expressed. (BL)

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ENVIRONMENTAL EDUCATION"

THE LAST HOPE OF MAN

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ANTHROPOLOGY PAPERS
FOR
14TH AND 15TH
CONFERENCES
OF THE
U.S. NATIONAL COMMISSION
FOR UNESCO

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"I truly believe that we in this generation must come to terms with nature, and I think it will be challenged as mankind has never been challenged before, to prove our humanity and mastery, not of nature, but of ourselves."

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"Keep your eyes open to the [illegible]
and you will [illegible]

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ENVIRONMENTAL "EDUCATION"

THE LAST MEASURE OF MAN

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(Editor's Note: A Sand County Almanac – for your own sake and that of your children and theirs – read it! There's a built-in guarantee – it will change your outlook "on" and "of" life. Now available in paperback (Ballantine Books) at newsstands.

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The National Commission was created by Congress and consists of 100 members appointed by the Secretary of State. Of these, 60 represent nongovernmental organizations, while 10 are appointed from the Federal Government, 15 from State and Local Government, and 15 at large.

"The chess-board is the world; the pieces are the phenomena of the universe; the rules of the game are what we call the laws of Nature. The player on the other side is hidden from us. We know that his play is always fair, just, and patient. But also we know, to our cost, that he never overlooks a mistake, or makes the smallest allowance for ignorance. . ."

- Thomas Huxley
(1825-1895)

FOREWORD

In November 1969 the U.S. National Commission for UNESCO convened a major conference in San Francisco on *Man and His Environment:* "A View Toward Survival". The emphasis there was to bring to the people of the United States an awareness of the *physical* "state of the world" as it pertained to pollution of the air, water and land; in other words, man's "outside environment".

Now, in four Regional Conferences, the Commission tackles another kind of pollution – perhaps more complex and more compelling than any other kind – by asking the question: "What is happening to man's 'inside environment'?" Or more graphically and succinctly: "Survival – For What?"

The inplications in that question stagger the imagination. The Commission feels strongly, however, that staggering towards the goal of world cooperation and understanding at least means we are still on our feet – not yet counted out.

The UNESCO preamble has an eloquen phrase: "Since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed". The words, in 1946, were riveted on the horrors of a war just ended – the result of a physical and human devastation without precedent. The motivation was peace – *man unto man.*

Now we know, belatedly and tragically, that man has been simultaneously waging an even more far-reaching war that encompasses no political boundaries – and puts no country against another – but each country against itself, against not a foe but a friend – more formidable than man himself – Nature.

Let's stagger the imagination a great deal more: it just could be that man will soon put together the greatest global "detente" in his history – in the common cause of preserving the only means for his survival anywhere – a Good Earth.

But to do so he will have to face, unalterably and inevitably, the question: "Survival: For What?"

THE PROPER STUDY OF MANKIND

It appears to me that, to one standing on the heights of philosophy, mankind and the works of man have sunk out of sight altogether; that man is altogether too much insisted on. The poet says the proper study of mankind is man. I say, study to forget all that; take wider views of the universe. That is the egotism of the race. What is this our childish, gossiping, social literature, mainly in the hands of the publishers? When another poet says the world is too much with us, he means, of course, that man is too much with us. In the promulgated views of man, in institutions, in the common sense, there is narrowness and delusion. It is our weakness that so exaggerates the virtues of philanthropy and charity and makes it the highest human attribute. The world will sooner or later tire of philanthropy and all religions based on it mainly. They cannot long sustain my spirit. In order to avoid delusions, I would fain let man go by and behold a universe in which man is but as a grain of sand. I am sure that those of my thoughts which consist, or are contemporaneous, with social personal connections, however humane, are not the wisest and widest, most universal. What is the village, city, State, nation, aye the civilized world, that it should concern a man so much? the thought of them affects me in my wisest hours as when I pass a woodchuck's hole. It is a comfortable place to nestle, no doubt, and we have friends, some sympathizing ones, it may be, and a hearth there; but I have only to get up at midnight, aye to soar or wander a little in my thought by day, to find them all slumbering. Look at our literature. What a poor, puny, social thing, seeking sympathy! The author troubles himself about his readers—would fain have one before he dies. He stands too near his printer; he corrects the proofs. Not satisfied with defiling one another in this world, we would all go to heaven together. To be a good man, that is, a good neighbor in the widest sense, is but little more than to be a good citizen. Mankind is a gigantic institution; it is a community to which most men belong. It is a test I would apply to my companion—can he forget man? can he see this world slumbering?

I do not value any view of the universe into which man and the institutions of man enter very largely and absorb much of the attention. Man is but the place where I stand, and the prospect hence is infinite. It is not a chamber of mirrors which reflect me. When I reflect, I find that there is other than me. Man is a past phenomenon to philosophy. The universe is larger than enough for man's abode. Some rarely go outdoors, most are always at home at night, very few indeed have stayed out all night once in their lives, fewer still have gone behind the world of humanity, seen its institutions like toadstools by the wayside.

– Henry David Thoreau

TESTAMENTS

OLD

Be fruitful, and multiply, and

Replenish the earth,

And subdue it: and

Have dominion. . . .

NEW

Blessed are the meek

For they shall inherit

The earth. . .

GOOD OAK

There are two spiritual dangers in not owning a farm. One is the danger of supposing that breakfast comes from the grocery, and the other that heat comes from the furnace.

To avoid the first danger, one should plant a garden, preferably where there is no grocer to confuse the issue.

To avoid the second, he should lay a split of good oak on the andirons, preferably where there is no furnace, and let it warm his shins while a February blizzard tosses the trees outside. If one has cut, split, hauled, and piled his own good oak, and let his mind work the while, he will remember much about where the heat comes from, and with a wealth of detail denied to those who spend the week end in town astride a radiator.

The particular oak now aglow on my andirons grew on the bank of the old emigrant road where it climbs the sandhill. The stump, which I measured upon felling the tree, has a diameter of 30 inches. It shows 80 growth rings, hence the seedling from which it originated must have laid its first ring of wood in 1865, at the end of the Civil War. But I know from the history of present seedlings that no oak grows above the reach of rabbits without a decade or more of getting girdled each winter, and re-sprouting during the following summer. Indeed, it is all too clear that every surviving oak is the product either of rabbit negligence or of rabbit scarcity. Some day some patient botanist will draw a frequency curve of oak birth-years, and show that the curve humps every ten years, each hump originating from a low in the ten-year rabbit cycle. (A fauna and flora, by this very process of perpetual battle within and among species, achieve collective immortality.)

It is likely, then, that a low in rabbits occurred in the middle sixties, when my oak began to lay on annual rings, but that the acorn that produced it fell during the preceding decade, when the covered wagons were still passing over my road into the Great Northwest. It may have been the wash and wear of the emigrant traffic that bared this roadbank, and thus enabled this particular acorn to spread its first leaves to the sun. Only one acorn in a thousand ever grew large enough to fight rabbits; the rest were drowned at birth in the prairie sea.

It is a warming thought that this one wasn't, and thus lived to garner eighty years of June sun. It is this sunlight that is now being released, through the intervention of my axe and saw, to warm my shack and my spirit through eighty gusts of blizzard. And with each gust, a wisp of smoke from my chimney bears witness, to whomsoever it may concern, that the sun did not shine in vain.

My dog does not care where heat comes from, but he cares ardently that it come, and soon. Indeed he considers my ability to make it come as something magical, for when I rise in the cold black pre-dawn and kneel shivering by the hearth making a fire, he pushes himself blandly between me and the kindling splits I have laid on the ashes, and I must touch a match to them by poking it between his legs. Such faith, I suppose, is the kind that moves mountains.

It was a bolt of lightning that put an end to woodmaking by this particular oak. We were all awakened, one night in July, by the thunderous crash; we realized that the bolt must have hit near by, but, since it had not hit us, we all went back to sleep. Man brings all things to the test of himself, and this is notably true of lightning.

GOOD OAK *and* THE LAND ETHIC *are two chapters from the book* "A SAND COUNTY ALMANAC" *by Aldo Leopold; reprinted by permission of The Oxford University Press. "No Deposit – No Return", a paperback (Addison-Wesley, Reading, Mass.) resulting from the U. S. National Commission's conference on Man and His Environment, edited by Huey D. Johnson, was dedicated to Aldo Leopold.*

GOOD OAK and THE LAND ETHIC from "A Sand County Almanac" by Aldo Leopold. Copyright (c) 1949 - 1953 - 1966 by Oxford University Press Inc. Reprinted by permission.

Next morning, as we strolled over the sandhill rejoicing with the cone-flowers and the prairie clovers over their fresh accession of rain, we came upon a great slab of bark freshly torn from the trunk of the roadside oak. The trunk showed a long spiral scar of barkless sapwood, a foot wide and not yet yellowed by the sun. By the next day the leaves had wilted, and we knew that the lightning had bequeathed to us three cords of prospective fuel wood.

We mourned the loss of the old tree, but knew that a dozen of its progeny standing straight and stalwart on the sands had already taken over its job of woodmaking.

We let the dead veteran season for a year in the sun it could no longer use, and then on a crisp winter's day we laid a newly filed saw to its bastioned base. Fragrant little chips of history spewed from the saw cut, and accumulated on the snow before each kneeling sawyer. We sensed that these two piles of sawdust were something more than wood: that they were the integrated transect of a century; that our saw was biting its way, stroke by stroke, decade by decade, into the chronology of a lifetime, written in concentric annual rings of good oak.

It took only a dozen pulls of the saw to transect the few years of our ownership, during which we had learned to love and cherish this farm. Abruptly we began to cut the years of our predecessor the boot-legger, who hated this farm, skinned it of residual fertility, burned its farmhouse, threw it back into the lap of the County (with delinquent taxes to boot), and then disappeared among the landless anonymities of the Great Depression. Yet the oak had laid down good wood for him; his sawdust was as fragrant, as sound, and as pink as our own. An oak is no respecter of persons.

The reign of the bootlegger ended sometime during the dust-bowl drouths of 1936, 1934, 1933, and 1930. Oak smoke from his still and peat from burning marshlands must have clouded the sun in those years, and alphabetical conservation was abroad in the land, but the sawdust shows no change.

Rest! cries the chief sawyer, and we pause for breath.

Now our saw bites into the 1920's, the Babbittian decade when everything grew bigger and better in heedlessness and arrogance–until 1929, when stock markets crumpled. If the oak heard them fall, its wood gives no sign. Nor did it heed the Legislature's several protestations of love for trees: a National Forest and a forest-crop law in 1927, a great refuge on the Upper Mississippi bottomlands in 1924, and a new forest policy in 1921. Neither did it notice the demise of the state's last marten in 1925, nor the arrival of its first starling in 1923.

In March 1922, the "Big Sleet" tore the neighboring elms limb from limb, but there is no sign of damage to our tree. What is a ton of ice, more or less, to a good oak?

Rest! cries the chief sawyer, and we pause for breath.

Now the saw bites into 1910-20, the decade of the drainage dream, when steam shovels sucked dry the marshes of central Wisconsin to make farms, and made ash-heaps instead. Our marsh escaped,not because of any caution or forbearance among engineers, but because the river floods it each April, and did so with a vengeance–perhaps a defensive vengeance –in the years 1913–16. The oak laid on wood just the same even in 1915, when the Supreme Court abolished the state forests and Governor Phillip pontificated that "state forestry is not a good business proposition." (It did not occur to the Governor that there might be more than one definition of what is good, and even of what is business. It did not occur to him that while the courts were writing one definition of goodness in the law books, fires were writing quite another one on the face of the land. Perhaps, to be a governor, one must be free from doubt on such matters.)

While forestry receded during this decade, game conservation advanced. In 1916 pheasants became successfully established in Waukesha County; in 1915 a federal law prohibited spring shooting; in 1913 a state game farm was started; in 1912 a 'buck law' protected female deer; in 1911 an epidemic of refuges spread over the state. 'Refuge' became a holy word, but the oak took no heed.

Rest! cries the chief sawyer, and we pause for breath.

Now we cut 1910, when a great university president published a book on conservation, a great sawfly epidemic killed millions of tamaracks, a great drouth burned the pineries, and a great dredge drained Horicon Marsh.

We cut 1909, when smelt were first planted in the Greak Lakes, and when a wet summer induced the Legislature to cut the forest-fire appropriations.

We cut 1908, a dry year when the forests burned fiercely, and Wisconsin parted with its last cougar.

We cut 1907, when a wandering lynx, looking in the wrong direction for the promised land, ended his career among the farms of Dane County.

We cut 1906, when the first state forester took office, and fires burned 17,000 acres in these sand counties; we cut 1905 when a great flight of goshawks came out of the North and ate up the local grouse (they no doubt perched in this tree to eat some of mine). We cut 1902-3, a winter of bitter cold; 1901, which brought the most intense drouth of record (rainfall only 17 inches); 1900, a centennial year of hope, of prayer, and the usual annual ring of oak.

Rest! cries the chief sawyer, and we pause for breath.

Now our saw bites into the 1890's, called gay by those whose eyes turn cityward rather than landward. We cut 1899, when the last passenger pigeon collided with a charge of shot near Babcock, two counties to the north; we cut 1898 when a dry fall, followed by a snowless winter, froze the soil seven feet deep and killed the apple trees; 1897, another drouth year, when another forestry commission came into being; 1896, when 25,000 prairie chickens were shipped to market from the village of Spooner alone; 1895, another year of fires; 1894, another drouth year; and 1893, the year of 'The Bluebird Storm,' when a March blizzard reduced the migrating bluebirds to near-zero. (The first bluebirds always alighted in this oak, but in the middle nineties it must have gone without.) We cut 1892, another year of fires; 1891, a low in the grouse cycle; and 1890, the year of the Babcock Milk Tester, which enabled Governor Heil to boast, half a century later, that Wisconsin is America's Dairyland. The motor licenses which now parade that boast were then not foreseen, even by Professor Babcock.

It was likewise in 1890 that the largest pine rafts in history slipped down the Wisconsin River in full view of my oak, to build an empire of red barns for the cows of the prairie states. Thus it is that good pine now stands between the cow and the blizzard, just as good oak stands between the blizzard and me.

Rest! cries the chief sawyer, and we pause for breath.

Now our saw bites into the 1880's; into 1889, a drouth year in which Arbor Day was first proclaimed; into 1887, when Wisconsin appointed its first game wardens; into 1886, when the College of Agriculture held its first short course for farmers; into 1885, preceded by a winter 'of unprecedented length and severity'; into 1883, when Dean W. H. Henry reported that the spring flowers at Madison bloomed 13 days later than average; into 1882, the year Lake Mendota opened a month late following the historic 'Big Snow' and bitter cold of 1881-2.

It was likewise in 1881 that the Wisconsin Agricultural Society debated the question, 'How do you account for the second growth of black oak timber that has sprung up all over the country in the last thirty years?' My oak was one of these. One debater claimed spontaneous generation, another claimed regurgitation of acorns by southbound pigeons.

Rest! cries the chief sawyer, and we pause for breath.

Now our saw bites the 1870's, the decade of Wisconsin's carousal in wheat. Monday morning came in 1879, when chinch bugs, grubs, rust, and soil exhaustion finally convinced Wisconsin farmers that they could not compete with the virgin prairies further west in the game of wheating land to death. I suspect that this farm played its share in the game, and that the sand blow just north of my oak had its origin in over-wheating.

This same year of 1879 saw the first planting of carp in Wisconsin, and also the first arrival of quackgrass as as a stowaway from Europe. On 27 October 1879, six migrating prairie chickens perched on the rooftree of the German Methodist Church in Madison, and took a look at the growing city. On 8 November the markets at Madison were reported to be glutted with ducks at 10 cents each.

In 1878, a deer hunter from Sauk Rapids remarked prophetically, 'The hunters promise to outnumber the deer'.

On 10 September 1877, two brothers, shooting Muskego Lake, bagged 210 blue-winged teal in one day.

In 1876 came the wettest year of record; the rainfall piled up 50 inches. Prairie chickens declined, perhaps owing to hard rains.

In 1875 four hunters killed 153 prairie chickens at York Prairie, one county to the eastward. In the same year the U.S. Fish Commission planted Atlantic salmon in Devil's Lake, 10 miles south of my oak.

In 1874 the first factory-made barbed wire was stapled to oak trees; I hope no such artifacts are buried in the oak now under saw!

In 1873 one Chicago firm received and marketed 25,000 prairie chickens. The Chicago trade collectively bought 600,000 at $3.25 per dozen.

In 1872 the last wild Wisconsin turkey was killed, two counties to the southwest.

It is appropriate that the decade ending the pioneer carousal in wheat should likewise have ended the pioneer carousal in pigeon blood. In 1871, within a 50-mile triangle spreading northwestward from my oak, 136 million pigeons are estimated to have nested, and some may have nested in it, for it was then a thrifty sapling 20 feet tall. Pigeon hunters by scores plied their trade with net and gun, club and salt lick, and trainloads of prospective pigeon pie moved southward and eastward toward the cities. It was the last big nesting in Wisconsin, and nearly the last in any state.

This same year 1871 brought other evidence of the march of empire: the Peshtigo Fire, which cleared a couple of counties of trees and soil, and the Chicago Fire, said to have started from the protesting kick of a cow.

In 1870 the meadow mice had already staged their march of empire; they ate up the young orchards of the young state, and then died. They did not eat my oak, whose bark was already too tough and thick for mice.

It was likewise in 1870 that a market gunner boasted in the *American Sportsman* of killing 6000 ducks in one season near Chicago.

Rest! cries the chief sawyer, and we pause for breath.

Our saw now cuts the 1860's, when thousands died to settle the question: Is the man-man community lightly to be dismembered? They settled it, but they did not see, nor do we yet see, that the same question applies to the man-land community.

This decade was not without its gropings toward the larger issue. In 1867 Increase A. Lapham induced the State Horticultural Society to offer prizes for forest plantations. In 1866 the last native Wisconsin elk was killed. The saw now severs 1865, the pith-year of our oak. In that year John Muir offered to buy from his brother, who then owned the home farm thirty miles east of my oak, a sanctuary for the wild-flowers that had gladdened his youth. His brother declined to part with the land, but he could not suppress the idea: 1865 still stands in Wisconsin history as the birthyear of mercy for things natural, wild, and free.

We have cut the core. Our saw now reverses its orientation in history; we cut backward across the years, and outward toward the far side of the stump. At last there is a tremor in the great trunk; the sawkerf suddenly widens; the saw is quickly pulled as the sawyers spring backward to safety; all hands cry 'Timber!'; my oak leans, groans, and crashes with earth-shaking thunder, to lie prostrate across the emigrant road that gave it birth.

Now comes the job of making wood. The maul rings on steel wedges as the sections of trunk are upended one by one, only to fall apart in fragrant slabs to be corded by the roadside.

There is an allegory for historians in the diverse functions of saw, wedge, and axe.

The saw works only across the years, which it must deal with one by one, in sequence. From each year the raker teeth pull little chips of fact, which accumulate in little piles, called sawdust by woodsmen and archives by historians; both judge the character of what lies within by the character of the samples thus made visible without. It is not until the transect is completed that the tree falls, and the stump yields a collective view of a century. By its fall the tree attests the unity of the hodge-podge called history.

The wedge, on the other hand, works only in radial splits; such a split yields a collective view of all the years at once, or no view at all, depending on the skill with which the plane of the split is chosen. (If in doubt, let the section season for a year until a crack develops. Many a hastily driven wedge lies rusting in the woods, embedded in unsplittable cross-grain.)

THE LAND ETHIC

By Aldo Leopold
(From "A Sand County Almanac")

When GOD-LIKE Odysseus returned from the wars in Troy, he hanged all on one rope a dozen slave-girls of his household whom he suspected of misbehavior during his absence.

This hanging involved no question of propriety. The girls were property. The disposal of property was then, as now, a matter of expediency, not of right and wrong.

Concepts of right and wrong were not lacking from Odysseus Greece: witness the fidelity of his wife through the long years before at last his black-prowed galleys clove the wine-dark seas for home. The ethical structure of that day covered wives, but had not yet been extended to human chattels. During the three thousand years which have since elapsed, ethical criteria have been extended to many fields of conduct, with corresponding shrinkages in those judged by expediency only.

This extension of ethics, so far studied only by philosophers, is actually a process in ecological evolution. Its sequences may be described in ecological as well as in philosophical terms. An ethic, ecologically, is a limitation on freedom of action in the struggle for existence. An ethic philosophically, is a differentiation of social from anti-social conduct. These are two definitions of one thing. The thing has its origin in the tendency of interdependent individuals or groups to evolve modes of co-operation. The ecologist calls these symbioses. Politics and economics are advanced symbioses in which the original free-for-all competition has been replaced, in part, by co-operative mechanisms with an ethical content.

The complexity of co-operative mechanisms has increased with population density, and with the efficiency of tools. It was simpler, for example, to define the anti-social uses of sticks and stones in the days of the mastodons than of bullets and billboards in the age of motors.

The first ethics dealt with the relation between individuals; the Mosaic Decalogue is an example. Later accretions dealt with the relation between the individual and society. The Golden Rule tries to integrate the individual to society; democracy to integrate social organization to the individual.

There is as yet no ethic dealing with man's relation to land and to the animals and plants which grow upon it. Land, like Odysseus' slave-girls, is still property. The land-relation is still strictly economic, entailing privileges but not obligations.

The extenson of ethics to this third element in human environment is, if I read the evidence correctly, an evolutionary possibility and an ecological necessity. It is the third step in a sequence. The first two have already been taken. Individual thinkers since the days of Ezekiel and Isaiah have asserted that the despoliation of land is not only inexpedient but wrong. Society, however, has not yet affirmed their belief. I regard the present conservation movement as the embryo of such an affirmation.

An ethic may be regarded as a mode of guidance for meeting ecological situations so new or intricate, or involving such deferred reactions, that the path of social expediency is not discernible to the average individual. Animal instincts are modes of guidance for the individual in meeting such situations. Ethics are possibly a kind of community instinct in-the-making.

The Community Concept

All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in the community, but his ethics prompt him also to co-operate (perhaps in order that there may be a place to compete for).

The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.

This sounds simple: do we not already sing our love for and obligation to the land of the free and the home of the brave? Yes, but just what and whom do we love? Certainly not the soil, which we are sending helter-skelter downriver. Certainly not the waters, which we assume have no function except to turn turbines, float barges, and carry off sewage. Certainly not the

plants, of which we exterminate whole communities without batting an eye. Certainly not the animals, of which we have already extirpated many of the largest and most beautiful species. A land ethic of course cannot prevent the alteration, management, and use of these 'resources,' but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state.

In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such.

In human history, we have learned (I hope) that the conqueror role is eventually self-defeating. Why? Because it is implicit in such a role that the conqueror knows, *ex cathedra,* just what makes the community clock tick, and just what and who is valuable, and what and who is worthless, in community life. It always turns out that he knows neither, and this is why his conquests eventually defeat themselves.

In the biotic community, a parallel situation exists. Abraham knew exactly what the land was for: it was to drip milk and honey into Abraham's mouth. At the present moment, the assurance with which we regard this assumption is inverse to the degree of our education.

The ordinary citizen today assumes that science knows what makes the community clock tick; the scientist is equally sure that he does not. He knows that the biotic mechanism is so complex that its workings may never be fully understood.

That man is, in fact, only a member of a biotic team is shown by an ecological interpretation of history. Many historical events, hitherto explained solely in terms of human enterprise, were actually biotic interactions between people and land. The characteristics of the land determined the facts quite as potently as the characteristics of the men who lived on it.

Consider, for example, the settlement of the Mississippi valley. In the years following the Revolution, three groups were contending for its control: the native Indian, the French and English traders, and the American settlers. Historians wonder what would have happened if the English at Detroit had thrown a little more weight into the Indian side of those tipsy scales which decided the outcome of the colonial migration into the cane-lands of Kentucky. It is time now to ponder the fact that the cane-lands, when subjected to the particular mixture of forces represented by the cow, plow, fire, and axe of the pioneer, became bluegrass. What if the plant succession inherent in this dark and bloody ground had, under the impact of these forces, given us some worthless sedge, shrub, or weed? Would Boone and Kenton have held out? Would there have been any overflow into Ohio, Indiana, Illinois, and Missouri? Any Louisiana Purchase? Any transcontinental union of new states? Any Civil War?

Kentucky was one sentence in the drama of history. We are commonly told what the human actors in this drama tried to do, but we are seldom told that their success, or the lack of it, hung in large degree on the reaction of particular soils to the impact of the particular forces exerted by their occupancy. In the case of Kentucky, we do not even know where the bluegrass came from – whether it is a native species, or a stowaway from Europe.

Contrast the cane-lands with what hindsight tells us about the Southwest, where the pioneers were equally brave, resourceful, and persevering. The impact of occupancy here brought no bluegrass, or other plant fitted to withstand the bumps and buffetings of hard use. This region, when grazed by livestock, reverted through a series of more and more worthless grasses, shrubs, and weeds to a condition of unstable equilibrium. Each recession of plant types bred erosion; each increment to erosion bred a further recession of plants. The result today is a progressive and mutual deterioration, not only of plants and soils, but of the animal community subsisting thereon. The early settlers did not expect this: on the cienegas of New Mexico some even cut ditches to hasten it. So subtle has been its progress that few residents of the region are aware of it. It is quite invisible to the tourist who finds this wrecked landscape colorful and charming (as indeed it is, but it bears scant resemblance to what it was in 1848).

This same landscape was 'developed' once before, but with quite different results. The Pueblo Indians settled the Southwest in pre-Columbian times, but they happened *not* to be equipped with range live stock. Their civilization expired, but not because their land expired.

In India, regions devoid of any sod-forming grass have been settled, apparently without wrecking the land, by the simple expedient of carrying the grass to the cow, rather than vice versa. (Was this the result of some deep wisdom, or was it just good luck? I do not know.)

In short, the plant succession steered the course of history; the pioneer simply demonstrated, for good or ill, what successions inhered in the land. Is history taught in this spirit? It will be, once the concept of land as a community really penetrates our intellectual life.

The Ecological Conscience

Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail's pace; progress still consists largely of letterhead pieties and convention oratory. On the back forty we still slip two steps backward for each forward stride.

The usual answer to this dilemma is 'more conservation education.' No one will debate this, but is it certain that only the *volume* of education needs stepping up? Is something lacking in the *content* as well?

It is difficult to give a fair summary of its content in brief form, but, as I understand it, the content is substantially this: obey the law, vote right, join some organizations, and practice what conservation is profitable on your own land; the government will do the rest.

Is not this formula too easy to accomplish anything worth-while? It defines no right or wrong, assigns no obligation, calls for no sacrifice, implies no change in the current philosophy of values. In respect of land-use, it urges only enlightened self-interest. Just how far will such education take us? An example will perhaps yield a partial answer.

By 1930 it had become clear to all except the ecologically blind that southwestern Wisconsin's topsoil was slipping seaward. In 1933 the farmers were told that if they would adopt certain remedial practices for five years, the public would donate CCC labor to install them, plus the necessary machinery and materials. The offer was widely accepted, but the practices were widely forgotten when the five-year contract period was up. The farmers continued only those practices that yielded an immediate and visible economic gain for themselves.

This led to the idea that maybe farmers would learn more quickly if they themselves wrote the rules. Accordingly the Wisconsin Legislature in 1937 passed the Soil Conservation District Law. This said to farmers, in effect: *We, the public, will furnish you free technical service and loan you specialized machinery, if you will write your own rules for land-use. Each county may write its own rules, and these will have the force of law.* Nearly all the counties promptly organized to accept the proffered help, but after a decade of operation, *no county has yet written a single rule.* There has been visible progress in such practices as strip-cropping, pasture renovation, and soil liming, but none in fencing woodlots against grazing, and none in excluding plow and cow from steep slopes. The farmers, in short, have selected those remedial practices which were profitable anyhow, and ignored those which were profitable to the community, but not clearly profitable to themselves.

When one asks why no rules have been written, one is told that the community is not yet ready to support them; education must precede rules. But the education actually in progress makes no mention of obligations to land over and above those dictated by self-interest. The net result is that we have more education but less soil, fewer healthy woods, and as many floods as in 1937.

The puzzling aspect of such situations is that the existence of obligations over and above self-interest is taken for granted in such rural community enterprises as the betterment of roads, schools, churches, and baseball teams. Their existence is not taken for granted, nor as yet seriously discussed, in bettering the behavior of the water that falls on the land, or in the preserving of the beauty or diversity of the farm landscape. Land-use ethics are still governed wholly by economic self-interest, just as social ethics were a century ago.

To sum up: we asked the farmer to do what he conveniently could to save his soil, and he has done just that, and only that. The farmer who clears the woods off a 75 per cent slope, turns his cows into the clearing, and dumps its rainfall, rocks, and soil into the community creek, is still (if otherwise decent) a respected member of society. If he puts lime on his fields and plants his crops on contour, he is still entitled to all the privileges and emoluments of his Soil Conservation District. The District is a beautiful piece of social machinery, but it is coughing along on two cylinders because we have been too timid, and too anxious for quick success, to tell the farmer the true magnitude of his obligations. Obligations have no meaning without conscience, and the problem we face is the extension of the social conscience from people to land.

No important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections, and convictions. The proof that conservation has not yet touched these foundations of conduct lies in the fact that philosophy and religion have not yet heard of it. In our attempt to make conservation easy, we have made it trivial.

Substitues For a Land Ethic

When the logic of history hungers for bread and we hand out a stone, we are at pains to explain how much the stone resembles bread. I now describe some of the stones which serve in lieu of a land ethic.

One basic weakness in a conservation system based wholly on economic motives is that most members of the land community have no economic value. Wild-flowers and songbirds are examples. Of the 22,000 higher plants and animals native to Wisconsin, it is doubtful whether more than 5 per cent can be sold, fed, eaten, or otherwise put to economic use. Yet these creatures are members of the biotic community, and if (as I believe) its stability depends on its integrity, they are entitled to continuance.

When one of these non-economic categories is thereatened, and if we happen to love it, we invent subterfuges to give it economic importance. At the beginning of the century songbirds were supposed to be disappearing. Ornithologists jumped to the rescue with some distinctly shaky evidence to the effect that insects would eat us up if birds failed to control them. The evidence had to be economic in order to be valid.

It is painful to read these circumlocutions today. We have no land ethic yet, but we have at least drawn nearer the point of admitting that birds should continue as a matter of biotic right, regardless of the presence or absence of economic advantage to us.

A parallel situation exists in respect of predatory mammals, reptorial birds, and fish-eating birds. Time was when biologists somewhat overworked the evidence that these creatures preserve the health of game by killing weaklings, or that they control rodents for the farmer, or that they prey only on 'worthless' species. Here again, the evidence had to be economic in order to be valid. It is only in recent years that we hear the more honest argument that predators are members of the community, and that no special interest has the right to exterminate them for the sake of a benefit, real or fancied, to itself. Unfortunately this enlightened view is still in the talk stage. In the field the extermination of predators goes merrily on: witness the impending erasure of the timber wolf by fiat of Congress, the Conservation Bureaus, and many state legislatures.

Some species of trees have been 'read out of the party' by economics-minded foresters because the grow too slowly, or have too low a sale value to pay as timber crops: white cedar, tamarack, cypress, beech, and hemlock are examples. In Europe, where forestry is ecologically more advanced, the non-commercial tree species are recognized as members of the native forest community, to be preserved as such, within reason. Moreover some (like beech) have been found to have a valuable function in building up soil fertility. The interdependence of the forest and its constituent tree species, ground flora, and fauna is taken for granted.

Lack of economic value is sometimes a character not only of species or groups, but of entire biotic communities: marshes, bogs, dunes, and 'deserts' are exampes. Our formula in such cases is to relegate their conservation to government as refuges, monuments, or parks. The difficulty is that these communities are usually interspersed with more valuable private land; the government cannot possibly own or control such scattered parcels. The net effect is that we have relegated some of them to ultimate extinction over large areas. If the private owner were ecologically minded, he would be proud to be the custodian of a reasonable proportion of such areas, which add diversity and beauty to his farm and to his community.

In some instances, the assumed lack of profit in the 'waste' areas has proved to be wrong, but only after most of them had been done away with. The present scramble to reflood muskrat marshes is a case in point.

There is a clear tendency in American conservation to relegate to government all necessary jobs that private landowners fail to perform. Government ownership, operation, subsidy, or regulation is now widely prevalent in forestry, range management, soil and watershed management, park and wilderness conservation, fisheries management, and migratory bird management, with more to come. Most of this growth in governmental conservation is proper and logical, some of it is inevitable. That I imply no disapproval of it is implicit in the fact that I have spent most of my life working for it. Nevertheless the question arises: What is the ultimate magnitude of the enterprise? Will the tax base carry its eventual ramifications? At what point will governmental conservation, like the mastodon, become handicapped by its own dimensions? The answer, if there is any, seems to be in a land ethic, or some other force which assigns more obligation to the private landowner.

Industrial landowners and users, expecially lumbermen and stockmen, are inclined to wail long and loudly about the extension of government ownership and regulation to land, but (with notable exceptions) they show little disposition to develop the only visible alternative: the voluntary practice of conservation on their own lands.

When the private landowner is asked to perform some unprofitable act for the good of the community, he today assents only with outstretched palm. If the

act costs him cash this is fair and proper, but when it costs only fore-thought, open-mindedness, or time, the issue is at least debatable. The overwhelming growth of land-use subsidies in recent years must be ascribed, in large part, to the government's own agencies for conservation education: the land bureaus, the agricultural colleges, and the extension services. As far as I can detect, no ethical obligation toward land is taught in these institutions.

To sum up: a system of conservation based solely on economic self-interest is hopelessly lopsided. It tends to ignore, and thus eventually to eliminate, many elements in the land community that lack commercial value, but that are (as far as we know) essential to its healthy functioning. It assumes, falsely, I think, that the economic parts of the biotic clock will function without the uneconomic parts. It tends to relegate to government many functions eventually too large, too complex, or too widely dispersed to be performed by government.

An ethical obligation on the part of the private owner is the only visible remedy for these situations.

The Land Pyramid

An ethic to supplement and guide the economic relation to land presupposes the existence of some mental image of land as a biotic mechanism. We can be ethical only in relation to something we can see, feel, understand, love, or otherwise have faith in.

The image commonly employed in conservation education is 'the balance of nature.' For reasons too lengthy to detail here, this figure of speech fails to describe accurately what little we know about the land mechanism. A much truer image is the one employed in ecology: the biotic pyramid. I shall first sketch the pyramid as a symbol of land, and later develop some of its implications in terms of land-use.

Plants absorb energy from the sun. This energy flows through a circuit called the biota, which may be represented by a pyramid consisting of layers. The bottom layer is the soil. A plant layer rests on the soil, an insect layer on the plants, a bird and rodent layer on the insects, and so on up through various animal groups to the apex layer, which consists of the larger carnivores.

The species of a layer are alike not in where they came from, or in what they look like, but rather in what they eat. Each successive layer depends on those below it for food and often for other services, and each in turn furnishes food and services to those above. Proceeding upward, each successive layer decreases in numerical abundance. Thus, for every carnivore there are hundreds of his prey, thousands of their prey, millions of insects, uncountable plants. The pyramidal form of the system reflects this numerical progression from apex to base. Man shares an intermediate layer with the bears, raccoons, and squirrels which eat both meat and vegetables.

The lines of dependency for food and other services are called food chains. Thus soil-oak-deer-Indian is a chain that has now been largely converted to soil-corn-cow-farmer. Each species, including ourselves, is a link in many chains. The deer eats a hundred plants other than oak, and the cow a hundred plants other than corn. Both, then, are links in a hundred chains. The pyramid is a tangle of chains so complex as to seem disorderly, yet the stability of the system proves to be a highly organized structure. Its functioning depends on the cooperation and competition of its diverse parts.

In the beginning, the pyramid of life was low and squat; the food chains short and simple. Evolution has added layer after layer, link after link. Man is one of thousands of accretions to the height and complexity of the pyramid. Science has given us many doubts, but it has given us at least one certainty: the trend of evolution is to elaborate and diversify the biota.

Land, then, is not merely soil; it is a fountain of energy flowing through a circuit of soils, plants, and animals. Food chains are the living channels which conduct energy upward; death and decay return it to the soil. The circuit is not closed; some energy is dissipated in decay, some is added by absorption from the air, some is stored in soils, peats, and longlived forests; but it is a sustained cirucit, like a slowly augmented revolving fund of life. There is always a net loss by downhill wash, but this is normally small and offset by the decay of rocks. It is deposited in the ocean and, in the course of geological time, raised to form new lands and new pyramids.

The velocity and character of the upward flow of energy depend on the complex structure of the plant and animal community, much as the upward flow of sap in a tree depends on its complex cellular organization. Without this complexity, normal circulation would presumably not occur. Structure means the characteristic numbers, as well as the characteristic kinds and functions, of the component species. This interdependence between the complex

structure of the land and its smooth functioning as an energy unit is one if its basic attributes.

When a change occurs in one part of the circuit, many other parts must adjust themselves to it. Change does not necessarily obstruct or divert the flow of energy. Evolution is a long series of self-induced changes, the net result of which has been to elaborate the flow mechanism and to lengthen the circuit. Evolutionary changes, however, are usually slow and local. Man's invention of tools has enabled him to make changes of unprecedented violence, rapidity, and scope.

One change is in the composition of floras and faunas. The larger predators are lopped off the apex of the pyramid; food chains, for the first time in history, become shorter rather than longer. Domesticated species from other lands are substitued for wild ones, and wild ones are moved to new habitats. In this world-wide pooling of faunas and floras, some species get out of bounds as pests and diseases, others are extinguished. Such effects are seldom intended or foreseen; they represent unpredicated and often untraceable readjustments in the structure. Agricultural science is largely a race between the emergence of new pests and the emergence of new techniques for their control.

Another change touches the flow of energy through plants and animals and its return to the soil. Fertility is the ability of soil to receive, store, and release energy. Agriculture, by overdrafts on the soil, or by too radical substitution of domestic for native species in the superstructure, may derange the channels of flow or deplete storage. Soils depleted of their storage, or of the organic matter which anchors it, wash away faster than they form. This is erosion.

Waters, like soil, are part of the energy circuit. Industry, by polluting waters or obstructing them with dams, may exclude the plants and animals necessary to keep energy in circulation.

Transportation brings about another basic change: the plants or animals grown in one region are now consumed and returned to the soil in another. Transportation taps the energy stored in rock, and in the air, and uses it elsewhere; thus we fertilize the garden with nitrogen gleaned by the guano birds from the fishes of seas on the other side of the Equator. Thus the formerly localized and self-contained circuits are pooled on a world-wide scale.

The process of altering the pyramid for human occupation releases stored energy, and this often gives rise, during the pioneering period, to a deceptive exuberance of plant and animal life, both wild and tame. These releases of biotic capital tend to becloud or postpone the penalties of violence.

This thumbnail sketch of land as an energy circuit conveys three basic ideas:

(1) That land is not merely soil.

(2) That the native plants and animals kept the energy circuit open; others may or may not.

(3) That man-made changes are of a different order than evolutionary changes, and have effects more comprehensive than is intended or foreseen.

These ideas, collectively, raise two basic issues: Can the land adjust itself to the new order? Can the desired alterations be accomplished with less violence?

Biotas seem to differ in their capacity to sustain violent conversion. Western Europe, for example, carries a far different pyramid than Caesar found there. Some large animals are lost; swampy forests have become meadows or plowland; may new plants and animals are introduced, some of which escape as pets; the remaining natives are greatly changed in distribution and abundance. Yet the soil is still there and, with the help of imported nutrients, still fertile; the waters flow normally; the new structure seems to function and to persist. There is no visible stoppage or derangement of the circuit.

Western Europe, then, has a resistant biota. Its inner processes are tough, elastic, resistant to strain. No matter how violent the alterations, the pyramid, so far, has developed some new *modus vivendi* which preserves its habitability for man, and for most of the other native.

Japan seems to present another instance of radical conversion without disorganization.

Most other civilized regions, and some as yet barely touched by civilization, display various stages of disorganization, varying from initial symptoms to advanced wastage. In Asia Minor and North Africa diagonsis is confused by climatic changes, which may have been either the cause or the effect of advanced wastage. In the United States the degree of disorganization varies locally; it is worst in the Southwest, the Ozarks, and parts of the South, and least in New England and the Northwest. Better land-uses may still arrest it in the less advanced regions. In parts of Mexico, South America, South Africa, and Australia a violent and accelerating wastage is in progess, but I cannot assess the prospects.

This almost world-wide display of disorganization in the land seems to be similar to disease in an animal,

except that it never culminates in complete disorganization or death. The land recovers, but at some reduced level of complexity, and with a reduced carrying capacity for people, plants, and animals. Many biotas currently regarded as 'lands of opportunity' are in fact already subsisting on exploitative agriculture, i.e. they have already exceeded their sustained carrying capacity. Most of South America is overpopulated in this sense.

In arid regions we attempt to offset the process of wastage by reclamation, but it is only too evident that the prospective longevity of reclamation projects is often short. In our own West, the best of them may not last a century.

The combined evidence of history and ecology seems to support one general deduction: the less violent the man-made changes, the greater the probability of successful readjustment in pyramid. Violence, in turn, varies with human population density; a dense population requires a more violent conversion. In this respect, North America has a better chance for permanence than Europe, if she can contrive to limit her density.

This deduction runs counter to our current philosophy, which assumes that because a small increase in density enriched human life, that an indefinite increase will enrich it indefinitely. Ecology knows of no density relationship that holds for indefinitely wide limits. All gains from density are subject ot a law of diminishing returns.

Whatever may be the equation for men and land, it is improbable that we as yet know all its terms. Recent discoveries in mineral and vitamin nutrition reveal unsuspected dependencies in the up-cirucit: incredibly minute quantities of certain substances determine the value of soils to plants, of plants to amimals. What of the down-circuit? What of the vanishing species, the preservation of which we now regard as an esthetic luxury? They helped build the soil; in what unsuspected ways may they be essential to its maintenance? Professor Weaver proposes that we use prairie flowers to reflocculate the wasting soils of the dust bowl; who knows for what purpose cranes and condors, otters and grizzlies may some day be used?

Land Health and the A-B Cleavage

A land, ethic, then, reflects the existence of an ecological conscience, and this in turn reflects a conviction of individual responsibility for the health of the land. Health is the capacity of the land for self-renewal. Conservation is our effort to understand and preserve this capacity.

Conservationists are notorious for their dissensions. Superficially these seem to add up to mere confusion, but a more cardful scrutiny reveals a single plane of cleavage common to many specialized fields. In each field one group (A) regards the land as soil, and it function as commodity-production; another group (B) regards the land as a biota, and its function as something broader. How much broader is admittedly in a state of doubt and confusion.

In my own field, forestry, group A is quite content to grow trees like cabbages, with cellulose as the basic forest commodity. It feels no inhibition against violence; its ideology is agronomic. Group B, on the other hand, sees forestry as fundamentally different from agronomy because it employs natural species, and manages a natural environment rather than creating an artificial one. Group B prefers natural reproduction on principle. It worries on biotic as well as economic grounds about the loss of species like chestnut, and the threatened loss of the white pines. It worries about a whole series of secondary forest functions: wildlife, recreation, watersheds, wilderness areas. To my mind, Group B feels the stirrings of an ecological conscience.

In the wildlife field, a parallel cleavage exists. For Group A the basic commodities are sport and meat; the yardsticks of production are ciphers of take in pheasants and trout. Artificial propagation is acceptable as a permanent as well as a temporary recourse – if its unit costs permit. Group B, on the other hand, worries about a whole series of biotic side-issues. What is the cost in predators of producing a game crop? Should we have further recourse to exotics? How can management restore the shrinking species, like prairie grouse, already hopeless as shootable game? How can management restore the threatened rarities, like trumpeter swan and whooping crane? Can management principles be extended to wildflowers? Here again it is clear to me that we have the same A-B cleavage as in forestry.

In the larger field of agriculture I am less competent to speak, but there seem to be somewhat parallel cleavages. Scientific agriculture was actively developing before ecology was born, hence a slower penetration of ecological concepts might be expected. More-over the farmer, by the very nature of his techniques, must modify the biota more radically than the forester or the wildlife manager. Nevertheless,

there are many discontents in agriculture which seem to add up to a new vision of 'biotic farming.'

Perhaps the most important of these is the new evidence that poundage or tonnage is no measure of the food-value of farm crops; the products of fertile soil may be qualitatively as well as quantitatively superior. We can bolster poundage from depleted soils by pouring on imported fertility, but we are not necessarily bolstering food-value. The possible ultimate ramifications of this idea are so immense that I must leave their exposition to abler pens.

The discontent that labels itself 'organic farming,' while bearing some of the earmarks of a cult, is nevertheless biotic in its direction, particularly in its insistence on the importance of soil flora and funa.

The ecological fundamentals of agriculture are just as poorly known to the public as in other fields of land-use. For example, few educated people realize that the marvelous advances in technique made during recent decades are improvements in the pump, rather than the well. Acre for acre, they have barely sufficed to offset the sinking level of fertility.

In all of these cleavages, we see repeated the same basic paradoxes: man the conqueror *versus* man the biotic citizen; science the sharpener of his sword *versus* science the searchlight on his universe; land the slave and servant *versus* land the collective organism. Robinson's injunction to Tristram may well be applied, at this juncture, to *Homo sapiens* as a species in geological time:

> Whether you will or not
> You are a King, Tristram, for you are one
> Of the time-tested few that leave the world,
> When they are gone, not the same place it was.
> Mark what you leave.

The Outlook

It is inconceivable to me that an ethical relation to land can exist without love, respect, and admiration for land, and a high regard for its value. By value, I of course mean something far broader than mere economic value; I mean value in the philosophical sense.

Perhaps the most serious obstacle impeding the evolution of a land ethic is the fact that our educational of a land ethic is the fact that our educational and economic system is headed away from, rather than toward, an intense consciousness of land. Your true modern is separated from the land by many middlemen, and by innumerable physical gadgets. He has no vital relation to it; to him it is the space between cities on which crops grow. Turn him loose for a day on the land, and if the spot does not happen to be a golf links or a 'scenic' area, he is bored stiff. If crops could be raised by hydroponics instead of farming, it would suit him very well. Synthetic substitutes for wood, leather, wool, and other natural land products suit him better than the originals. In short, land is something he has 'outgrown.'

Almost equally serious as an obstacle to a land ethic is the attitude of the farmer for whom the land is still an adversary, or a taskmaster that keeps him in slavery. Theoretically, the mechanization of farming ought to cut the farmer's chains, but whether it really does is debatable.

One of the requisites for an ecological comprehension of land is an understanding of ecology, and this is by no means co-extensive with 'education'; in fact, much higher education seems deliberately to avoid ecological concepts. An understanding of ecology does not necessarily originate in courses bearing ecological labels; it is quite as likely to be labeled geography, botany, agronomy, history, or economics. This is as it should be, but whatever the label, ecological training is scarce.

The case for a land ethic would appear hopeless but for the minority which is in obvious revolt against these 'modern' trends.

The 'key-log' which must be moved to release the evolutionary process for an ethic is simply this: quit thinking about decent land-use as solely an economic problem. Examine each question in terms of what is ethically and esthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.

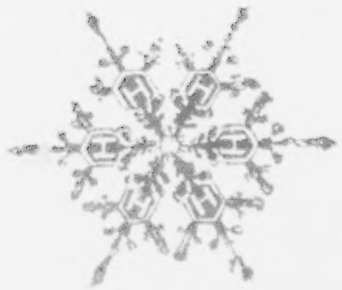
It of course goes without saying that economic feasibility limits the tether of what can or cannot be done for land. It always has and it always will. The fallacy the economic determinists have tied around our collective neck, and which we now need to cast off, is the belief that economics determines *all* land-use. This is simply not true. An innumerable host of actions and attitudes, comprising perhaps the bulk of all land relations, is determined by the land-users' tastes and predilections, rather than by his purse. The bulk of all land relations hinges on investments of time, forethought, skill, and faith rather than on investments of cash. As a land-user thinketh, so is he.

I have purposely presented the land ethic as a product of social evolution because nothing so important as an ethic is ever 'written.' Only the most superficial student of history supposes that Moses 'wrote' the Decalogue; it evolved in the minds of a thinking community, and Moses wrote a tentative summary of it for a 'seminar.' I say tentative because evolution never stops.

The evolution of a land ethic is an intellectual as well as emotional process. Conservation is paved with good intentions which prove to be futile, or even dangerous, because they are devoid of critical understanding either of the land, or of economic land-use. I think it is a truism that as the ethical frontier advances from the individual to the community, its intellectual content increases.

The mechanism of operation is the same for any ethic: social approbation for right actions: social disapproval for wrong actions.

By and large, our present problem is one of attitudes and implements. We are remodeling the Alhambra with a steam-shovel, and we are proud of our yardage. We shall hardly relinquish the shovel, which after all has many good points, but we are in need of gentler and more objective criteria for its successful use.



THE ECOLOGICAL FACTS OF LIFE

By Barry Commoner

(from No Deposit-No Return, an anthology of papers presented at the 13th National Conference of the U.S. National Commission for UNESCO, November 1969, San Francisco, Calif.)

Several months ago the people of the earth held their breath as a spaceship with three men nearly missed the planet and hurtled hopelessly into black space. The earth itself, now, is headed on a similar death tangent. Commoner, with great care, demonstrates why we must get the earth and her life systems back into a circular closed pattern.

To understand the content of this paper is to know the principles of ecology and to have the informational base for a survival ethic, Even though the paper is concise and suited to the layman, it may take several readings to digest. It is well worth it; one couldn't spend time better in laying a personal foundation for action.

– Huey D. Johnson, Editor
"No Deposit – No Return"

The ecological facts of life are grim. The survival of all living things–including man–depends on the integrity of the complex web of biological processes which comprise the earth's ecosystem. However, what man is now doing on the earth violates this fundamental requisite of human existence. For modern technologies act on the ecosystem which supports us in ways that threaten its stability; with tragic perversity we have linked much of our productive economy to precisely those features of technology which are ecologically destructive.

These powerful, deeply entrenched relationships have locked us into a self-destructive course. If we are to break out of this suicidal track we must begin by learning the ecological facts of life. If we are to find the road to survival we must discover how to mold the technology to the necessities of nature, and learn how these constraints must temper the economic and social demands on technology. This, I believe, is the momentous task which now confronts mankind – a task for which this conference is intended to ready us.

It is the purpose of this contribution to provide some factual background to the foregoing assertions.

1. THE ORIGIN OF THE ECOSYSTEM

The global ecosystem in which we now live is the product of several billion years of evolutionary change in the composition of the planet's skin. Following a series of remarkable geochemical events, about two billion years ago there appeared a form of matter, composed of elements common on the earth's surface, but organized in a manner which set it sharply apart from its antecedents – life. Themselves the products of several billion years of slow geochemical processes, the first living things became, in turn, powerful agents of geochemical change.

To begin with, they depleted the earth's previously accumulated store of the organic products of geochemical evolution, for this was their food, Converting much of this food into carbon dioxide, the earth's early life forms sufficiently increased the carbon dioxide content of the planet's atmosphere to raise the average temperature – through the "greenhouse" effect – to tropical levels. Later there appeared the first photosynthetic organisms, which reconverted carbon dioxide into the organic substances that are essential to all living metabolism. The rapid proliferation of green plants in the tropical temperature of the early earth soon reduced the carbon dioxide concentration of the atmosphere, thereby lowering the earth's temperature and depositing a huge mass of organic carbon which became in time the store of fossil fuels. And with the photosynthetic cleavage of water, the earth for the first time acquired free oxygen in its atmosphere. By shielding the earth's surface from solar ultraviolet radiation (through the concurrent appearance of ozone), this event enabled life to emerge from the protection of an original underwater habitat. With free oxygen available, new, more efficient forms of living metabolism became possible and the great evolutionary outburst of proliferating species of plants and animals began to populate the planet. Meanwhile terrestrial plants and microorganisms converted the earth's early

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rocks into soil and developed within it a remarkably complex ecosystem; a similar system developed in surface waters. Taken together, these ecosystems control the composition of the soil, of surface waters and the air, and consequently regulate the weather.

There is an important lesson here. In the form in which it first appeared, the earth's life system had an inherently fatal fault; The energy it required was derived from the destruction of a nonrenewable resource, the geochemical store of organic matter. The primeval life system became capable of continued existence only when, in the course of evolution, organisms appeared that converted carbon dioxide and inorganic salts to new organic matter– thus closing the loop and transforming what was a fatally linear process into a circular, self-perpetuating one. Here in its primitive form we see the grand scheme which has since been the basis of the remarkable continuity of life: the reciprocal interdependence of one life process on another.

In the course of further evolution the variety of living things proliferated; new interactions became possible, greatly enriching the network of events. Cycles were built on cycles, forming at last a vast and intricate web, replete with branches, interconnections and alternate pathways; these are the bonds that link together the fate of all the numerous animals, plants, and microorganisms that inhabit the earth. This is the global ecosystem. It is a closed web of physical, chemical and biological processes created by living things, maintained by living things, and through the marvelous reciprocities of biological and geochemical evolution, uniquely essential to the support of living things.

2. THE BASIC PROPERTIES OF THE ECOSYSTEM

We know enough about some parts of this vast system to delineate the fundamental properties of the whole. These properties define the requirements of any activity – including human society – which is to function successfully within the ecosystem of the earth.

a) Because they are fundamentally circular processes and subject to numerous feedback effects, ecosystems exhibit nonlinear responses to changes in the intensity of any single factor.

Consider, for example, the ecological processes which occur in surface waters, such as lakes and rivers. This is the cycle which links aquatic animals to their organic wastes; these wastes to the oxygen-requiring microorganisms that convert them into inorganic nitrate, phosphate and carbon dixoide; the inorganic nutrients to the algae which photosynthetically reconvert them into organic substances (thereby also adding to the oxygen content of the water and so providing support for the animals and the organisms of decay); and algal organic matter to the chain of animals which feed on it, thus completing the cycle.

Since it is a cyclical system with closed feedback loops, the kinetic properties of this ecosystem are strikingly nonlinear. If the load of organic waste imposed on the system becomes too great, the demand of the bacteria of decay for oxygen may exceed the limited oxygen content of the water. When the oxygen content falls to zero, the bacteria die, the biological cycle breaks down, and organic debris accumulates. A similar nonlinearity is observed in the growth of algae. If the nutrient level of the water becomes so great as to stimulate the rapid growth of algae, the dense algal population cannot be long sustained because of the intrinsic limitations of photosynthetic efficiency. As the thickness of the algal layer in the water increases, the light required for photosynthesis that can reach the lower parts of the algal layer becomes sharply diminished, so that any strong overgrowth of algae very quickly dies back, again releasing organic debris. These are relatively simple examples of the ubiquitious propensity of ecosystems for strongly nonlinear responses, for dramatic overgrowths and equally dramatic collapse.

b) Because the chemical events that occur in an ecosystem are driven by the metabolism of living things, they are subject to the special constraints of biological chemistry.

One important characteristic is that the rate of chemical reactions in living cells, being determined by the catalytic action of enzymes, is subject to the considerable specificity of enzymes for their substrates. Another feature is a consequence of the long course of evolutionary selection which has been at work in living things. Living cells are capable of carrying out an enormous variety of particular chemical reactions. What is remarkable, however, is that the number of different biochemical substances which are actually synthesized in living cells is *very much smaller* than the number of substances which could, in theory, be formed – given the types of reactions which can occur. Thus conditions suitable for the separate chemical reactions which give rise to both *dextro* and *levo* amino acids are present in cells – but because of the stereospecificity of the

relevant enzyme system, only the syntheses of the *levo* forms occurs at an appreciable rate. Because of similar constraints, cells produce many fatty acids with even-numbered carbon chain lengths, but no fatty acids with odd numbers of carbons. Similarly, organic compounds which contain NO groups are singularly lacking in living things.

Thus, living systems have had a long opportunity to, so to speak, try out the enormous variety of biochemical reactions that *could* take place in the cell. In effect, the biochemical constituents now found in living cells represent the survivors of this evolutionary trial, presumably selected for their compatibility with the essential features of the overall system of cellular metabolism. This situation is analogous to the tendency of genes found in current organisms to be maximally advantageous–i.e., nearly all mutations to alternative genes are lethal. Therefore, in the same sense we can expect that the entry into an ecosystem of an organic reagent not normally found in living systems is likely to have deleterious effects on some living organisms.

c) The feedback characteristics of ecosystems result in amplification and intensification processes of considerable magnitude.

The fact that in food chains small organisms are eaten by bigger ones and the latter by still bigger ones inevitably results in the concentration of certain environmental constituents in the bodies of the largest organisms at the top of the food chain. Smaller organisms always exhibit much higher metabolic rates than larger ones, so that the amount of their food which is oxidized, relative to the amount incorporated into the body of the organism, is thereby greater. Consequently, an animal at the top of the food chain depends on the consumption of an enormously greater mass of the bodies of organisms lower down in the food chain. Therefore, any *non* metabolized material present in the lower organisms of this chain will become concentrated in the body of the top one.

d) Because of the circularity of ecosystems and their complex branching patterns, the behavior of any given living member of the system is dependent on the behavior of many others.

The specific relationships are varied: One organism may provide food for another; one organism may parasitize and kill another; two organisms may cooperate so closely in their livelihood as to become totally dependent on each other. As a result of such relationships, a change in the population of any one organism is likely to have powerful effects on other populations. Because of these numerous interconnections, a single cause-and-effect relationship is rare. Instead, a given intrusion on an ecosystem is likely to have effects which spread out in an ever-widening circle from its original source, affecting organisms and parts of the environment often very remote from the initial point of intrusion.

e) The stability of an ecosystem is achieved by a complex network of dynamic equilibria which permits alternative relationships to develop when any particular link in the network becomes inoperative.

In a very simple form, this relationship is illustrated by a common farmyard practice. The farmer who wishes to maintain cats in order to control mice will provide for the cats an alternative source of food, a doorstep dish of milk. Otherwise, the cats might kill so many mice as to run out of food, and they would then leave the farm in search of richer fields. There is an increasing body of more sophisticated evidence to support the generalization that the stability of an ecosystem depends closely on its degree of complexity, on the fineness of the ecological web.

f) The cyclical processes of an ecosystem operate at an overall rate which is determined by the intricate coupling of the numerous separate events that constitute the whole.

One result is that the ecosystem web has a kind of natural resonance frequency which may become evident in periodic fluctuations in a particular population of organisms – for example, seven-year locusts. Similarly, an ecosystem seems to be characterized by a specific "relaxation time" – that is, a rate at which it can successfully respond to an external intrusion by means of internal readjustment. Hence, we can expect the system to maintain its integrity only so long as external intrusions impinge on it at a rate which is compatible with the natural time-constant of the cycle as a whole. Thus, an environmental change – for example, in temperature – which develops slowly may permit organisms to adapt or to evolve adaptive forms, and the system as a whole can persist. In contrast, a rapid, cataclysmic environmental change, such as that which trapped the arctic mastodons in fields of ice, can override the system's natural rate of adaptation and destroy it.

3. HUMAN INTRUSIONS ON THE ECOSYSTEM

This brief summary gives us a working knowledge of the system that constitutes the environment – a system generated by the evolution of the vast variety of living things on the earth. But among these living things is man, an organism which has learned how to manipulate natural forces with intensities that go far beyond those attainable by any other living thing. For example, human beings expend in bodily energy roughly 1,000 kilowatt hours per year. However, in a highly developed country such as the United States, the actual expenditure of energy per capital is between 10,000 and 15,000 kilowatt hours per year. This extension of the impact of human beings on the ecosphere is, of course, a consequence of technology. Prehistoric man withdrew from the atmosphere only the oxygen required for respiration, but technological man consumes a far greater amount of oxygen to support fires, power plants, and chemical processes. The carbon dioxide produced by technological processes has measurably altered the carbon dioxide concentration of the atmosphere. Technology has had effects on the ecosystem which approach the magnitude of the natural processes themselves. Technology has also introduced into the environment substances wholly new to it, such as synthetic pesticides, plastics, and man-made radioisotopes.

What we mean by environmental deterioration is the untoward effect of human activities, especially technology, on the quality of the environment and on the stability of the ecological processes which maintain it. Given the previous list of ecosystem properties it is illuminating to determine the degree to which our major technological activities are consistent with them. Such an inquiry reveals that much of our technology is, in its very success as a productive enterprise, a grave threat to the stability of the ecosystem. Some examples follow.

a) Sewage Treatment Technology

One of the best-developed technologies is sewage treatment, a technique intended to convert the noxious organic materials of human wastes into innocuous materials that can be assimilated into the aquatic ecosystem. This technology reflects an excellent understanding of *part* of the aquatic cycle: Given sufficient oxygen, aquatic microorganisms can convert organic matter to innocuous inorganic products which are readily carried off in surface waters. By domesticating such microorganisms in artificially aerated sewage plants, we can indeed convert nearly all of the organic matter of sewage into inorganic products and discharge them to rivers and lakes.

So far, so good; the fatal stress of an overburden of organic matter on the stability of the aquatic cycle is avoided. But given the circularity of the process, it is evident that now a new stress must appear, this time the impact of excessive inorganic nutrients on the growth of algae. And given the nonlinearity involved in the growth of dense algal populations, we ought to expect trouble at this point. And indeed the trouble has come – but it has been largely unexpected. Only in the last decade, when the effects of algal overgrowths had already largely destroyed the self-purifying capability of an ecosystem as massive as Lake Erie, was the phenomenon recognized as a serious limitation on the technology of sewage treatment. In effect, the modern system of sewage technology has failed in its stated aim of reducing the organic oxygen demand on surface waters because it did not take into account the circularity of the ecological system on which it intruded. Because of this circularity, the inorganic products of sewage treatment were themselves reconverted to organic nutrients by the algae, which on their death simply reimposed the oxygen demand that the treatment was supposed to remove on the lakes and rivers. This failure can be attributed, therefore, to a simple violation of a fundamental principle of ecology. The price that we pay for this defect is the nearly catastrophic pollution of our surface waters.

b) The Nitrogen Cycle

One of the great fundamental cycles in the ecosystem is that traversed by the element nitrogen. In this cycle the vast store of the element in the nitrogen gas of the air is converted to the organic materials of the soil and water; the latter is in turn transformed ultimately to nitrate, which is in turn the source of organic forms of nitrogen in plants and in the animals that feed on them. Finally, such organic matter is returned to the soil as waste, completing the cycle. The nitrogen cycle of the soil is of enormous importance in agricultural technology, being the basis for the yields of protein and other nitrogenous foods which it produces.

In natural soils nitrates are produced slowly in the soil by the action of microorganisms on humus. Once free in the soil nitrate is quickly taken up by plant roots and converted to proteins. Most plants ordinarily contain little free nitrate, and in an efficient natural soil system nitrate production and removal are so

dynamically balanced as to keep the nitrate level of the soil relatively low as well. As a result, little of it leaches into surface waters, so that the concentration of nitrate in surface waters is ordinarily only of the order of a few parts per million.

In the United States, as in most advanced countries, the nitrogen cycle has been subjected to major changes arising from new agricultural technology. One important change has been the development of a break in the physical continuity of the nitrogen cycle, especially in the Midwest. Originally, in the Midwest cattle were raised and fattened largely by grazing in pastures, from which they acquired their nutrition and to which they contributed organic wastes which maintained the natural fertility of the soil. As indicated earlier, in such a natural system the nitrogen cycle in the soil operates with low levels of soil nitrate, so that relatively little of the latter leaches into surface waters.

However, in recent years, a major change has taken place: most cattle are removed from the pasture for a considerable period of fattening in confined feedlots. Here, feed is brought to the animals and their wastes become heavily deposited in a local area. The natural rate of conversion of organic waste to humus is limited, so that in a feedlot most of the nitrogenous waste is converted to soluble forms (ammonia and nitrate). This material is rapidly evaporated or leached into ground water beneath the soil, or it may run directly into surface waters during rainstorms. This is responsible, in part, for the appearance of high nitrate levels in some rural wells supplied by ground water, and for serious pollution problems due to eutrophication in a number of streams in the Midwest. Where feedlot manure is allowed to reach surface water untreated, it imposes a heavy oxygen demand on streams already overloaded by municipal wastes.

A livestock animal produces much more waste than a human being, and the total waste produced by domestic animals in the United States is about ten times that produced by the human population. Much of this waste production is confined to feedlots. For example, in 1966 more than 10 million cattle were maintained in feedlots before slaughter, an increase of 66% over the preceding eight years. This represents about one-half the total United States cattle population. Because of the development of feedlot techniques, the United States is confronted with a huge wast disposal problem – considerably greater than the human sewage which we are attempting to handle with grossly inadequate treatment.

The physical separation of livestock from the soil is related to an even more complex chain of events, which again leads to severe ecological problems. When, as in much of the Midwest, the soil is used for intensive grain production rather than pasturage, the humus content is depleted; generally such soils now contain about one-half the humus present before intensive agriculture was introduced (i.e., ca. 1880). In order to maintain and increase crop productivity, farmers have resorted to increasingly heavy applications of inorganic fertilizer, expecially of nitrogen. Since 1945 the annual use of inorganic nitrogen fertilizer in the United States has increased about 14-fold. This has yielded an appreciable increase in crop productivity. However, in a humus-depleted soil, porosity is reduced; as a result, plant roots are not adequately aerated, and their efficiency in withdrawing nutrient salts from the soil is diminished. In these conditions, the crop may be well nourished by using inorganic fertilizer to maintain a high nitrate level around the roots. However, since efficiency of nutrient uptake is low, a good deal of the nitrate is not taken up by the crop, but leaches into ground water or drains from the fields into lakes and streams. Where streams traverse heavily fertilized farmlands, for example, in Illinois, nitrate concentrations in excess of the levels which lead to algal overgrowths have been observed consistently in recent years. Nearly all the streams in Illinois are now polluted by algal overgrowths. When such streams are the source of municipal water supplies – as they are in some Illinois towns – there is a risk of infant methemoglobinemia, due to the conversion of excess nitrate to nitrate in the infant's digestive tract.

We see in the impact of modern agricultural technology on the nitrogen cycle gross violations of a number of basic ecological principles. Feedlot practice breaks the physical continuity of the cycle, transferring organic wastes from large soil areas, where they can be accommodated into the natural cycle, to confined places, or surface waters. Here the heavy, rapid influx of organic matter, or of its inorganic degradation products, stresses the natural system beyond its capacity to accommodate, and the cycle breaks down, destroying the self-purifying capacity of surface waters and introducing nitrates in toxic amounts into livestock and man. Reflected in this situation is the propensity for the multiplication and spread of ecological perturbations, and the inability of an ecosystem to accommodate a stress which is imposed at a rate which exceeds the system's natural rate of response.

The most serious long-term effect of modern agricultural technology on the nitrogen cycle may be

due to its effects on the natural complexity – and therefore stability – of the soil ecosystem. For example, modern agricultural systems have increasingly reduced the use of legumes which, with their associated bacteria, are capable of restoring the organic nitrogen content of the soil through fixation of nitrogen taken from the air. Recent studies, especially of tropical areas, suggest strongly that microbial nitrogen fixation is far more important in maintaining the nitrogen cycle than was believed previously. There appear to be numerous bacteria, not only in legumes, but widely associated with many different species of plants, that are capable of rapid conversion of air nitrogen into useful soil materials. When this subject has been more fully investigated, it is likely to be found, I believe, that such widespread bacterial nitrogen fixation has been a major factor in maintaining the natural fertility of soil, not only in the tropics but in temperate regions as well.

What is particularly alarming is that this natural process of nitrogen fixation is seriously disrupted by inorganic nitrogen fertilizers. It has been known for some time from laboratory experiments that when nitrogen-fixing bacteria are exposed to excessive amounts of nitrate, the process of nitrogen fixation stops. Under these conditions nitrogen-fixing bacteria may not survive or, if they do, may mutate to nonfixing forms. It is probable, therefore, that the widespread use of inorganic nitrogen fertilizer is depleting the natural population of microbial nitrogen-fixers, upon which we do have to rely considerably in any program to restore the natural efficiency of the soil. Here then is an instance in which a new technology – intensive use of inorganic nitrogen fertilizer – cuts important strands in the web of ecosystem processes, thereby impoverishing the structure of the system, laying it open to collapse under the continued stress of the technology, and diminishing the opportunities for recovery.

c) Synthetic Detergents

The story of the nondegradable detergents introduced into the environment during the period 1945 - 1955 is now well known, but the lessons are worth recording here. This technological failure was again the result of a lack of concern with one of the distinctive features of natural biological systems – that their chemical events are governed by the extreme catalytic specificity of enzymes. The nondegradability of these detergents was due to the failure of the enzymes in the bacteria of decay to break down the carbon-carbon bonds in the organic backbone of the detergents, a process which these bacteria readily carry out on natural hydrocarbon chains, such as those of fatty acid soaps. The failure can be traced to the fact that the nondegradable detergents possessed a branched carbon skeleton, for it is quite characteristic of degradative enzymes to prefer unbranched chains over branched ones. For 50 years this specificity has been known to biologists and had, in fact, for a long time been employed in starch technology to produce highly branched residual dextrins from partial enzymatic degradation branched starches. Here again is the technological failure of a massive intrusion into the environment which resulted from a lack of concern with one of the fundamental principles of ecology – the extreme specificity of chemical events in natural biological systems.

The nondegradable detergents have now been largely replaced by straight-chain substances which are therefore accessible to the action of bacterial enzymes. But this change still fails to make modern detergent technology compatible with the demands of ecology, for the new detergents, like the old ones, contain considerable amounts of polyphosphate. The massive introduction of this material into the surface waters through municipal sewage (the phosphate released to surface waters from this source has increased about 27-fold since 1900) has sharply increased the nutrient available to algae and has therefore exacerbated the effect of sewage treatment technology on algal overgrowths. A good deal of the pollution due to algal overgrowths can be traced to phosphate imposed on surface waters by detergents in municipal wastes – again a failure to observe the ecological facts of life.

d) Insecticides

One important aspect of the biological capital on which agricultural productivity depends is the network of ecological relationships that relate insect pests to the plants on which they feed, and to the other insects and birds that, in turn, prey on the pests. These natural relations serve to keep pest populations in check. Pests which require a particular plant as food are kept in check by their inability to spread onto other plants; the other insects which parasitize and prey upon them exert important biological control over the pest population.

What has happened in attempts to control cotton pests – where the great bulk of synthetic insecticide is used in the United States – shows how we have broken down these natural relations and allowed the normal pest-regulating machinery to get out of hand. Here the massive use of the new insecticides has killed off some of

the pests that once attacked cotton. But now the cotton plants are being attacked instead by new insects that were never previously known as pests of cotton. Moreover, the new pests are becoming increasingly resistant to insecticide, through the natural biological process of selection, in the course of inheritance, of resistant types. In the Texas cotton fields, for exmaple, in 1963 it took 50 times as much DDT to control insect pests as it did in 1961. The tobacco budworm, which now attacks cotton, has been found to be nearly immune to methylparathion, the most powerful of the widely used modern insecticides.

In certain important cotton-growing areas the insecticides kill off insect predators and parasites, which are often more sensitive to the insecticide than the pest itself. The result: insecticide-induced outbreaks of pests. Finally, DDT affects liver enzymes which inactivate sex hormones; one result is that DDT causes abnormal shell formation in birds, which is the apparent cause of the sharp decline in the population of certain raptorial species.

If we continue to rely on such broad-spectrum insecticides, recovery of the natural forms of control will become increasingly difficult. Where restoration of natural biological control has been successful, it has depended on a natural reservoir of insects which are predatory or parasitic toward the pests; if, through widespread dissemination of insecticides, species that make up this natural reservoir are lost, biological control may be difficult to reestablish.

The ecological failures involved in the use of DDT and related insecticides are only too evident: the failure to anticipate that an unnatural substance such as DDT is likely to be incompatible with the evolution-tested system of cellular biochemistry; the failure to take into account the effect of food chains on the accumulation of DDT in the bodies of top carnivores, including man; the failure to appreciate the multiple relationships which regulate the population of a given insect; the failure to anticipate the nonlinear responses which cause massive insect outbreaks.

And again, this is an instance in which a new technology is destructive of the natural biological capital – the biological systems of control – upon which we must depend for stable agricultural productivity.

e) Some Other Examples

In further support of the generalization that we consistently fail to take into account basic ecosystem properties in our recent technological developments, certain other examples are worthy of brief note.

A long list of examples can be provided which show that the effects of amplification and biological interactions on substances newly introduced into the ecosphere have been ignored. Apart from the earlier example of DDT, these include: the accumulation of iodine 131 in the thyroids of animals and human beings following dissemination of this radioisotope from nuclear explosions and, more recently, from peaceful operation of nuclear reactors; the appearance of toxic levels of mercury, applied to seeds in the form of mercurial fungicides, and ultimately found in the eggs of hens fed on the grain produced on the plants grown from such seeds. A particularly striking example of such a failure to take into account ecological amplification effects in technological considerations was reported recently by Tamplin, relative to radioactive wastes from nuclear reactors. Starting from the radioactive materials, which according to AEC standards would be allowed to enter a typical river ecosystem during reactor operation, Tamplin has calculated the effects of amplification in the food chain. He shows that, following passage through the food chain, certain radioisotopes released into a river at allowable concentrations can become concentrated in fish at levels which exceed the maximum permissible concentrations if used as human food.

The multiple consequences of environmental intrusions have also been unanticipated by technological planners. Consider a proud example of modern technology, the Aswan High Dam on the Upper Nile River. The dam has already cut down the flow of nutrients to the Mediterranean, reducing the algal population and the productivity of the local fishing industry. At the same time, the dam and its attendant irrigation system are likely to cause a catastrophic increase of snail-borne schizosomiasis in the Egyptian population. Another example of such "ecological backlash" is the unexpected effect of a campaign to control malaria in remote mountain villages in Sarawak, Malaysia. The insecticides not only killed mosquitos, but also poisoned cockroaches as well; these were eaten by the village cats, which died. As a result, disease-bearing rodents – primarily controlled by the cats – invaded the villages and serious epidemics resulted. The natural balance was finally restored when the Royal Air Force organized a parachute drop of a force of fresh cats for the villages.

4. THE ECONOMIC BENEFITS AND ECOLOGICAL HAZARDS OF TECHNOLOGY

The technologies which are responsible for the environmental problems cited above were designed for, and have in fact achieved, important benefits to human welfare: increased food production through the intensive use of inorganic nitrogen fertilizer, and through improved cattle-feeding techniques; improved control of harmful insects through the use of insecticide sprays; improved crop yields due to the use of mercurial fungicides. Most of our major new pollutants are similarly connected to technological benefits. Photochemical smog is a consequence of the development of the efficient and widely used, modern high-compression gasoline engine. Due to their elevated operating temperatures, high-compression engines bring about the combination of nitrogen and oxygen in the air. And smog is the result of a complex chain of chemical events triggered by the release of nitrogen oxides. Similarly, nuclear reactors improve our power resources, but at the same time pollute the environment with man-made radioisotopes and with excessive heat.

These pollution problems arise not out of some minor inadequacies in the new technologies, but because of the very success of these technologies in accomplishing their designed aims. A modern sewage treatment plant causes algal overgrowths and resultant pollution *because* it produces, as it is designed to do, so much plant nutrient in its effluent. Modern, highly concentrated nitrogen fertilizers result in the drainage of nitrate pollutants into streams and lakes just *because* they succeed in the aim of raising the nutrient level of the soil. The modern high-compression gasoline engine contributes to smog and nitrate pollution *because* it successfully meets its design criterion – the development of a high level of power. Modern synthetic insecticides kill birds, fish, and useful insects just *because* they are successful in being absorbed by insects, and killing them, as they are intended to do.

Moreover, there are usually sound economic reasons for the specific technological design which leads to environmental deterioration. This is particularly evident in the case of the intensive use of inorganic nitrogen fertilizer. Since 1945 the cost of farm labor, land, and machinery in the United States has risen about 50–60%, but in that time the cost of fertilizer has *declined* about 25%. Moreover, intensive use of fertilizer, especially of nitrogen, provides a quick return on the farmer's investment; a fertilizer investment made in the spring is quickly reflected in the return obtained from the crop in the fall. As a result, intensive fertilizer use has become crucial to the farmer's economic success. Certain government policies have intensified this effect. For example, the establishment of the Land Bank system has encouraged farmers to grow more crops on less land. This can be accomplished by very intensive use of nitrogen fertilizer, which permits a marked increase in the number of crop plants grown per acre. Similarly, feedlot operations represent a more economically efficient use of agricultural investment than do purely grazing operations.

We can expect, therefore, that effort to reduce such environmental hazards will compete with the benefits available from the technological process, at least in economic terms. Thus, a nuclear power plant *can* be built in such a way as to reduce the resultant radioactive or thermal pollution. But this increases the cost of plant construction, raises the price of power, and reduces the plant's competitive position with respect to other types of power production. Similarly, it would be possible to reduce nitrate pollution from feedlots by requiring the installation of complete (i.e., including tertiary treatment) disposal systems for the resultant wastes, but this would reduce the economy of the feedlot operation, perhaps below that of old-fashioned pasture operation. Organic fertilizers could be reintroduced in place of inorganic nitrogen fertilizer, but since the latter are cheaper to obtain and to spread, crop production costs would rise.

Equally complex relationships encumber most of our major pollution problems. It is now apparent that urban pollution due to photochemical smog cannot be eliminated without replacing present individual use of gasoline-engine transport with electric-powered mass transit systems, or possibly by replacing them with steam-driven vehicles. The first of these actions would require a massive new economic burden on cities which are already unable to meet their social obligations; the second course would mean a serious disruption of one of the mainstays of our economy, the automobile industry. The construction of nuclear power plants is now governed by certain federal standards regarding allowable emission of radioactive wastes. These represent a distinct – if poorly evaluated – health hazard resulting, for example, from the accumulation of iodine 131 in the thyroid. If emission standards are made more rigorous, the added expense might render the nuclear power industry incapable of competing with fossil-fuel power plants. This would severely curtail a major, federally financed technological program, and would clearly require a serious political decision.

There is an important generalization to be derived from these observations: Part of the social value of new technological processes – their productivity and economic efficiency – depends on the *avoidance* of a reckoning with the important social costs represented by the ecological hazards which they cause. In effect, the social utility of such new technology is delicately balanced on a scale which can be readily tipped by actions designed to prevent their hazards to the environment. Such a corrective action becomes, thereby, a trigger which can readily set off major economic, social, and political sequelae.

In sum, environmental pollution is not to be regarded as an unfortunate, but incidental, by-product of the growth of population, the intensification of production, or of technological progress. It is, rather, an intrinsic feature of the very technology which we have developed to enhance productivity. Our technology is enormously successful in producing material goods, but too often it is disastrously incompatible with the natural environmental systems that support not only human life, but technology itself. Moreover, these technologies are now so massively embedded in our system of industrial and agricultural production that any effort to make them conform to the demands of the environment will involve serious economic dislocations. If, as I believe, environmental pollution is a sign of major incompatibilities between our system of productivity and the environmental system that supports it, then, if we are to survive, we must successfully confront these economic obligations, however severe and challenging to our social concepts they may be.

5. WHAT IS TO BE DONE?

We are concerned, in this conference, with developing ways to mobilize the resources of this nation – and ultimately, if the 1972 United Nations Conference is to succeed – of the world for a momentous effort to restore the ecological stability of the planet. Some suggestions for the needed action are relevant here.

We ought to begin, I believe, by preparing a public declaration that there is now a clear and present danger to the integrity of the ecosphere and therefore to the survival of man. While some of us have made individual efforts in this direction, I believe that the public is entitled to hear from the scientific community as a whole, or at least some organized segment of it, that human survival is now at risk. Among the consequences of such a declaration should be the establishment, in the United States as well as in all the nations that expect to participate in the United Nations Conference, of large-scale efforts to evaluate the major ecological stresses that are now operative on the earth. We shall then need to define the ecological constraints within which each major technology must operate if it is to avoid a fatal stress on the stability of the ecosphere. Finally, we shall need to develop new types of technologies which can help to restore the broken strands in the earth's ecological web. If, as seems clear, the complexity of the ecological network is a prime source of the stability of the ecosphere, a major goal of science and technology ought to be the restoration of previously broken ecological links, and, if need be, the establishment of new ones.

This much is, I believe, the direct responsibility of the scientific and technological community. But we have one more duty. The task of restoring the planet's ecological stability is vast, complex, and deeply rooted in ecomonic, social, and political issues. The most grave social judgments must be made. This is a responsibility which belongs not in the hands of scientists and technologists, but to all the people. However, to make these judgments and to organize the vast restorative program, the public will need to have the relevant facts in understandable terms. Here, too, we in the scientific community have a responsibility. As the custodians of this knowledge, we owe it to our fellow citzens to help inform them about the crisis in the environment. Public judgement is essential for the action needed to restore the ecological balance of the earth; but such action can succeed only if it is guided by judgment which is *informed* by the facts.

This, I believe, is the task which is placed before us by the ecological facts of life: to organize the survival of man.

MORE PERSPECTIVE

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"Love begets love as life begets life; and eventually every part of the environment should be open to this response even if, under the command of love, one sometimes serves it best by withdrawing and allowing it, like a redwood forest or an ancient monument, to remain itself, simply mirrored in man's mind, without more than the faintest sign of man's own presence. . .'

"We live by helping one another, a soldier in combat wrote. This applies to all creatures at all times; and it holds not only for survival but for further human development. . ."

"In all Darwin's thinking he was there in person: not merely as an abstract intellect but as a sensitive, sympathetic human being. Darwin not only studied organisms objectively: he loved living creatures almost as warmly as Saint Francis did, grieved even over the cruel training of performing dogs, and sturdily opposed the current practice of vivisection. In his alliance with all forms of life, Darwin was in the noble line of a succession of similar naturalists, from Gilbert White and Linnaeus to Humboldt and Audubon. . ."

"So, too, Darwin shrank from killing and disecting the pigeons he bred; and he would have shrunk even more from contemporary high school courses in biology, whose first lesson is how to kill a frog. Finding himself losing his early taste for poetry and painting, he lamented this as a loss of happiness, and observed that it 'may possibly be injurious to the intellect, and more probably to moral character, by enfeebling the emotional part of our nature'. . ."

"All thinking worthy of the name now must be ecological, in the sense of appreciating and utilizing organic complexity, and in adapting every kind of change to the requirements not of man alone, or of any single generation, but of all his organic partners and every part of his habitat. . ."

"If we are to prevent megatechnics from further controlling and deforming every aspect of human culture, we shall be able to do so only with the aid of a radically different model derived directly, not from machines, but from living organisms and organic complexes (ecosystems). What can be known about life only through the process of living – and, so is part of the experience of even the humblest of organisms – must be added to all the other aspects that can be observed, abstracted, measured. . ."

"The path of human advance is not toward such collective automation but toward the increase of personal and communal autonomy; and any system that reverses this direction not merely turns man's most highly developed organ, his brain, into a virtual nonentity, but cuts itself off from the most precious products of storehouse and powerhouse of images, forms, ideas, institutions, and structures, through which man rises above the conditions of his immediate environment. To reduce or destroy this heritage is to inflict brain damage on the human race. . ."

"The unbaring of man's historic past during the last two centuries may well prove a more important contribution to man's survival than all his other scientific knowledge. . ."

"I have taken life itself to be the primary phenomenon, and creativity, rather than 'the conquest of nature', as the ultimate criterion of man's biological and cultural success. . ."

"As a team of oxen are we driven
By the ploughman, our teacher
By the furrows made are thus writ
Our actions – on the earth, our paper.
The sweat of labor is as beads
Falling by the ploughman as seeds sawn.
We reap according to our measure
Some of ourselves to Keep, some to others give.
O Nanak, this is the way to truly live. . . ."

– from The Granth Sahib,
The sacred scripture of
The Sikh religion

Epilogue: The Advancement of Life*

Mere power and mere knowledge exalt human nature but do not bless it. We must gather from the whole store of things such as make most for the uses of life.

Francis Bacon

In earlier books I have sought to describe the formative processes of nature and culture through which man has emerged as the apex so far of organic development. "Human life in its historic manifoldness and purposefulness, is our starting point. No single being can embrace that life; no single lifetime contains it; no single culture can encompass all its potentialities. One cannot even partly understand the nature of man, unless one realizes that its roots lie buried in the debris of countless invisible lives and that its topmost branches must by their very frailty defy the most daring climber. Man lives in history; he lives through history; and in a certain sense, he lives for history, since no small part of his activities goes toward preparation for an undisclosed future." ('The Conduct of Life.')

Man's existence in all its dimensions is perhaps best understood in terms of the theater, as a drama unfolding in action. If I have repeated this metaphor more than once it is because I know no more scientific analysis that does such justice to every aspect of human development. In his earthly theater man is by turns architect and scenic designer, director and stagehand, playwright and spectator; and above all he is an actor whose whole life is "such stuff as dreams are made on."Yet he is so formed and shaped by the nature of the stage, by the roles that he assumes, by the plots that he superimposes, that every aspect of the drama has substance and takes on some measure of significance.

Though in the dim beginnings of man's emergence the scenario was improvised from moment to moment, from scene to scene, he himself has become increasingly conscious of his own special roles, and now, with more than Prospero's magic spells, he occupies the center of the stage. On many occasions the plot has been misdirected and the play has seemed little better than a wry comedy of errors; at other moments, it rises to a brief, soul-searching climax, amid which even the properties and costumes cease to be trivial accessories and actively sustain the drama – only to fall back, as in the final act of 'King Lear,' into lacerating confusion.

This drama takes place in a cosmic setting; and its beginning and ending must remain forever outside the boundaries of actual human experience. Whatever the defects of this metaphor, of one thing one may be sure: the empty building, the stage properties, or the apparatus for manipulating the scenery and the lights do not in any sense constitute the drama, or justify the immense collective effort necessary to assemble and train the cast. By themselves, none of the physical constituents, not even the human bodies, are important. It is only through illumination by the mind of man that either the cosmic or the human drama makes sense.

In so far as the universal religions, and not a few more primitive cults and myths, have had some sense of the all-enveloping cosmic process as more significant than anything that is immediately visible and intelligible on the stage, they have had a firmer hold on reality than those delimited, factual descriptions that remain unaware of the wonder and mystery of the whole performance. Cosmodrama, biodrama, technodrama, politodrama, autodrama – to use Patrick Geddes's terms – provide the scenario and setting of human existence. And if in this study of 'The Myth of the Machine' I have emphasized the technodrama, it is not because I have accepted the technocratic belief that the command of nature is man's most important task, but because I regard technology as a formative part of human culture as a whole. As such, technics has been deeply modified at every stage of its development by dreams, wishes, impulses, religious motives that spring directly, not from the practical needs of daily life, but from the recesses of man's unconscious. It is in the human mind that these dramas take form; and it is there that they culminate

*From THE PENTAGON OF POWER: MYTH OF THE MACHINE, by Lewis Mumford

from time to time in flashes that suddenly light up the wide landscape of human existence.

From the mountains of rubble, slag, rubbish, bones, dust, excrement that bear witness to the works and days of each passing generation, a few milligrams of radioactive mind-energy have in the course of history been extracted, and from them, only a fractional amount has been preserved. That fraction, passing from mind to mind, has the property of irradiating the rest of existence with meaning and value. Like the radioactive elements themselves, these dynamic and formative attributes of mind are extremely powerful, but evanescent: yet their half-life, as with the ancient Egyptian organization of the megamachine, may last for thousands of years.

So far, nonetheless, these activating manifestations of mind are the ultimate witnesses to the cosmos itself – whose potentialities remained invisible and undetectable for billions of years until man himself, through the massive growth of his brain, achieved his greatest technological triumph: the invention of symbols and complex symbolic structures that enhance consciousness. For it was initially through the fabrications of the mind, through dream and symbol, not alone through the cunning of his hands, that man learned to command his own bodily organs, to communicate and cooperate with his kind, and to master so much of the natural environment as would serve his actual needs and ideal purposes.

The sober, day-to-day descriptions of human existence take man's subjective activities for granted. They reflect the preoccupation of the workshop with materials and tools, the preoccupation of the merchant with buying and selling or the preoccupation with quantitiative measurements necessary for every kind of large-scale organization. All these pragmatic interests refer to an existence in which the creative role of mind, though always present, may for 'practical purposes' be disregarded. As Galileo put it, and as the exponents of the power complex agreed, counting and measuring are the attributes of mind that have objective reality; and whatever cannot be accounted for mathematically, or quantitatively described, may be ignored as rationally unimportant and virtually nonexistent.

As long as older manifestations of mind, variously embodied in religion and art, in ritual and social custom, gave a coherent symbolic organization to support other aspects of life, the belief that material objects exist and function by themselves did no immediate damage. In daily life all that was deliverately left out in the mechanical world picture still remained actively present and gave play to other parts of man's nature besides those that subserved technics. Whatever Bacon and Galileo omitted from their account of nature, Shakespeare and Pascal brilliantly kept in existence; even Bacon, though no Shakespeare, had a vivid sense of the empty spaces that were left unaccounted for, no matter how accurately this or that part of the 'objective' picture might be faithfully delineated, or brought under technological control.

Unfortunately, those who equated reality with 'objective,' mechanical, quantitatively measurable modes of thought, not merely disregarded the immense creativity of the human mind in other areas but remained increasingly indifferent to the wonder of the whole cosmic performance. Newton, still deeply steeped in religious culture, was humble before the mystery that his own prodigious intellectual performance had only magnified, and continued to ask questions he could not answer about the nature of the beauty and order his mind recognized in those physical forces that are remote from human passions. But those materialist philosophers who – as they supposed – had left art and religion, values and purposes, behind them, who gave precedence to unminded 'matter,' denied the source of their own creativity: for the very idea of quantitative measurement or mathematical interpretation is a subjective one, known only to man. In so far as modern technology operated on these limited terms, so contrary to those that created all earlier forms of polytechnics, it could only muffle up and isolate the human presence as a source of contamination.

The translation of brute experience into significant cultural forms, so that every aspect of existence will ultimately bear some impress of mind, is surely the central fact of human development. This is what distinguishes a higher culture from a lower one, a vacuous existence from a purposeful one, a superior, mentally activated, fully developed human being from one who has barely risen above a dull animal state of being. Through man's prolonged efforts at minding and making, he who was originally speechless, workless, houseless, artless, took on his supreme task– that of making himself human. To this end he utilized his specific bodily functions for other purposes than those that served reproduction and survival.

By shaping and directing his own organs, beginning with the control of his bowels and his bladder, deliberately inhibiting or releasing, curtailing or enlarging every other organic function, even learning the most difficult art of effectively canalizing his once random mental activities, man did something more

important than 'conquer nature.' For in time he reorganized every part of nature, his own body as well as his habitat, for purposes that transcended animal existence. From the beginning, technics had an active part to play in this self-transformation; but it neither instituted these activities by itself nor until our own age, did it seek to narrow man's capacities to those that could be confined to a technological outlet.

Man is his own supreme artifact. But this passage from animal to human has been no easy one; and it is far from finished; many further developments still loom ahead. All through history there have been fixations, regressions, degradations, monotonous cyclical repetitions, institutionalized errors and horrors, and terminal disintegrations. On all these negative aspects. A.J. Toynbee's 'A Study of History' presents voluminous evidence. Yet despite these blockages, there have been intermittent, if not incessant, evidences of high creativity and genuine development, culminating in symbolic personalities, mythical and natural, human and divine, that still set a standard for further human development.

Without these possibilities for subjective transcendence, which are basic to man's whole development, it is doubtful if such a hyper-sensitive organism as man's could have survived the terrors and ordeals that were painfully magnified by the sweep and depth of his own consciousness: disease, bodily injury, senseless accident, human malignity, institutional corruption. An age like our own, whose subjectivity trusts only one channel, that through science and technology, is ill-prepared to face the stark realities of life. Even those who still cling to the ancient heritage of religion to the dehumanized assumptions of technology that only a scattering of faithful souls have dared to challenge even its grossest perversions.

The existence in man of a dynamic internal world, whose essential nature cannot be probed by any instrument, and can be known only when it finds expression in gestures and symbols and constructive activities, is a mystery as profound as the forces that bind together the components of the atom and account for the character and behavior of the elements. In man that mystery can be experienced, but not described, still less explained: for the mind cannot mirror itself from within. Only by getting outside itself does it become conscious of its inwardness.

The effort to eliminate the formative role of the mind, making the artifact more important than the artificer, reduces mystery to absurdity; and that affirmation of absurdity is the life-heresy of the present generation. This reductionism turns at last into the drooling blankness of 'Waiting for Godot' or 'Krapp's Last Tape,' with their representation of boredom and tedium as the inevitable climax of human existence. This in itself is a sardonic final commentary on the mechanical world picture, the power system, and the subjective life cannot claim any human value for even its own highest products.

An organic world picture cannot, howerver, deny entropy. It must accept as given the breaking down processes that accompany all vital activities: indeed, they are no less an integral part of life, no less a contrapuntal contribution to its creativity than the orderly, constructive, upbuilding functions; for the two processes can no more be separated than body and soul, brain and mind, until they are arrested in death. But there is latent energy in the mind that in rare monments by-passes these organic limitations and ignores or defies the ultimate terminus of death: this reveals itself as the impulse to transcendence. The recognition as a species that man possesses a deep longing to overcome his organic limitations, and that this aspiration may give significance even to the most distressing moments of existence, has been the benign gift of religion, and accounts, surely, for the hold it has had over the mass of mankind. This office is all the more singular because it frequently flouts the requirements for organic maintenance, reproduction, and survival: hence it cannot be derived from animal needs as so many other human functions, not least those of technics, can be derived.

Despite the elimination of subjectivity from the mechanical world picture, the desire for perfection, the need to defy and circumvent fate, the impulse to transcendence, can be observed in technology, too, along with other manifestations common to religion, like the readiness to accept sacrifice and premature death.

Consider the ancient dream of effecting the transmutation of the baser metals into gold. That may be easiy dismissed with contempt as a childish effort to get rich quickly; but if riches alone had been the object there were a hundred demonstrably better ways at hand. The desire to overcome physical limitations owed as much to the mind as chemistry did to the alchemist's furnace: so impetuous, so willful, so insistent, was this desire that it sometimes tempted the alchemists to fake the results by hiding a pellet of gold in the ashes. But this subjective impulse to transcend the limitations of 'matter' has turned out to be closer to reality than the well-grounded inhibitions against it: the alchemists' dream, we now realize, pointed to the ultimate miracle of nuclear fission.

This great over-simplification and self-deception was originally bolstered up by the mechanical world picture; and it still remains in effect even though that world picture now influences only the more backward areas of science. As I showed earlier, the idea of time is more important than any physical instrument invented for recording time; and this idea took form in the human mind, with no other instrument than the naked human eye observing planetary motions and calculating them with the aid of abstract mathematical symbols that like wise existed only in the human mind. The idea of time did not come from either the sundial or the hour-glass: neither would any direct improvement of these instruments by the human hand have produced the mechanical clock.

As Newton astutely observed in his 'Optics,' it is through tracing the causes of phenomena from their physical effects that we come to the First Cause; and this, he added, "is certainly not mechanical." If I dare amend that statement in order to apply it, not to the physical universe but to human affairs, it would be by finding the First Cause, not alone in Newton's all-pervading Divine Organizer, but in the human mind.

To hold that man's subjective impulses and fantasies must be given as much weight as formative influences in culture, indeed as prime movers, as either the impressions made on his senses by the 'physical world' or by the varied tools and machines he has contrived in order to modify that world may seem to many, even today, a somewhat daring hypothesis. In our one-sided picture of the universe, man himself has become the displaced person: out of sight and therefore out of mind, an exile and a starving prisoner in a concentration camp he himself has laid out.

In reacting against the uncontrolled subjectivism of earlier world pictures our Western culture has gone to the opposite extreme. Once upon a time people gave far too much authority to their uncorrected and incorrigible fantasies, and they ignored the fact that men cannot by exclusive concentration upon their inner life survive and reproduce except by the charity and grace of others who do not suffer from such delusions: a truth that the Hippies will in time find out. The failure to create a coherent transcendental world picture that did sufficient justice to the existential and subjectively unalterable facts of human experience has been the fatal weakness of all religions. But this subjective error has now been overcorrected, and has in turn produced a notion that is equally false: namely, that the organization of physical and corporeal activities can prosper in a mindless world.

The present analysis of technics and human development rests on belief in the imperative need for reconciling and fusing together the subjective and the objective aspects of human experience, by a methodology that will ultimately embrace both. This can come about, not by dismissing either religion or science, but first by detaching them from the obsolete ideological matrix that has distorted their respective developments and limited their field of interaction. Man's marvellous achievements in projecting his subjective impulses into institutional forms, esthetic symbols, mechanical organizations, and architectural structures have been vastly augmented by the orderly cooperative methods that science has exemplified and universalized. But at the same time, to reduce acceptable subjectivity to the ideal level of a computer would only sever rationality and order from their own deepest sources in the organism. If we are to save technology itself from the aberrations of its present leaders and putative gods, we must, in both our thinking and our acting, come back to the human center: for it is here that all significant transformations begin and terminate.

The nature of this interplay and this union between the subjective and objective aspects of existence defies any extensive description, since it involves nothing less than the entire history of mankind. So it was left for a poet to sum up this underlying reality in a few words. What Goethe said about nature applies equally to every manifestation of culture and personality. "Nature has neither core nor skin: she's both at once outside and in." It is on that assumption that I have given equal weight, in describing man's technological advances, to every part of his organism, not to the hand and its derivative tools alone. And this is why, too, I have emphasized the part played by wishes and projects, by symbols and fantasies, upon even the most practical applications of technology. For it is through all the activities of the mind, not alone the intelligence and the dynamic instruments of intelligence, that radical departures from conventional practices are made in technics itself.

This approach, if sound, carries with it a conclusion that challenges those who imagine that the forces and institutions now in existence will go on indefinitely, becoming bigger and more powerful, even though their very bigness and power threaten to nullify the benefits originally sought. If human culture in fact arises, develops, and renews itself through fresh activities in the mind, it may be modified and transformed by the same processes. What the human mind has created, it can also destroy. Neglect or withdrawal of interest works as effectively as physical assault. This is a lesson that our

machine-oriented world must quickly assimilate, if it is to preserve enven its own successful innovations.

In order summarily to describe the active part man has played in his technical development – as contrasted with the view that he is the fated victim of external forces and external institutions over which he has little or no control – I purpose to follow the interplay of man's subjective and objective life in two complementary movements: materialization and etherialization. Paradoxically, the process of materialization begins in the mind, while that of etherialization proceeds from the visible and external world to the inner personallity, finally taking form in the mind, through words and other symbols, as a more or less coherent world view.

The following account of the modes of human development must not be confused, because of the verbal resemblance, with either Hegelian idealism or Marxian materialism, though there is a modicum of abstract truth in both those philosophies, with their recognition of dynamic and contradictory processes, which I seek to reconcile with concrete historic realities. An organic concept of cultural and personal change must treat both inner and outer aspects as coeval, not mutually exclusive. Emerson, in his 'Essay on War,' came near to formulating my own view when he said: "Observe how every truth, every error, each a thought of some man's mind, clothes itself in societies, houses, cities, language, ceremonies, newspapers." I am grateful to Emerson for realizing – contrary to both Hegel and Marx – that error as well as truth, evil as well as good, may play a part, for, as he noted in 'Uriel,' "Evil will bless, and ice will burn."

Both etherialization and materialization go through a series of distinguishable but not always successive phases; and if they take place at the same time, they move in opposite directions – though not always at the same pace or with the same impact in different areas of the same culture. If etherialization begins originally in the direct impression that the external habitat and its inhabitants make on man's mind, materialization begins rather in the human mind itself, at a stage prior to abstraction and symbolization: the stage of dreams and pre-conscious activities whose stimulus comes mainly from within, through the hormones and endocrines, notably those connected with sex, hunger, and fear.

The first phase of materialization springs from neural activities to which the term 'mind' can hardly yet be attached: what later will come forth as an 'idea' might with greater accuracy be called an apparition, more impalpable than the traditional ghost. This apparition is, by definition, and entirely private experience, unformed, wordless, incommunicable – and therefore more difficult to lay hold of than even a nocturnal dream. Obviously such an intuitive process cannot be investigated scientifically: its existence can only be deduced by a backword reading from the internal organs of the body, including the brain itself, which shows activity even in sleep, must be posited as the starting point for all formalized and organized mental life.

The existence of these formless subjective activities might remain questionable were it not for the fact that they have a tendency, if heeded – and especially if frequently repeated – to take on a stable character. Thus the 'idea' of courage, before it can be called an idea, may assume the recallable image of a lion. To pass from what is internal, unconscious, and private, to a public world which can be shared by other men is the next stage in materialization. At this point, the nascent idea, well before it can find words to express itself, first does so in the language of the body. It is by this process that formative ideas that may eventually dominate a whole society take possession of a living person, and in time become visible to other men. *'Idees-forces.'* was alfred Fouillee's happy term for such dynamic and formative ideas.

Most germinal 'ideas' die a-borning: they never pass beyond the stage of apparition. Even an idea viable enough and lucky enough to survive must undergo a long period of incubation and experimental testing, before it becomes sufficiently palpable as an idea to get lodged, like a windblown seed, in a niche favorable to its growth. That niche must be a living person, though not always the originator and only begetter. This is the phase of 'incarnation.'

Even before an idea can be transmitted in speech it becomes, if one may use the classic New Testament description, incarnate in the flesh, and makes itself known by appropriate bodily changes. Do not suppose that the preliminary phases of intuition and ideation are in any sense mystical: they are commonplaces of everyday experience. Nor does the concept of incarnation refer necessarily to the particular theological epiphany from which we derive the term. In Volume One of 'The Myth of The Machine' I showed how the idea of 'Kingship' arose as a transcendental image of power and authority derived from a fusion of the commanding experience of a mighty hunting chief with the worship of a solar deity, Atum-Re – or in Sumer and Akkad, with an equally powerful Storm God who there took precedence.

But we need not look to ancient Mesopotamia, Egypt, or Palestine for examples of incarnation. The yearning for a primitive counter-culture, defying the rigidly organized and depersonalized forms of Western civilization, began to float into the Western mond in the original expressions of Romanticism among the intellectual classes. That desire to return to a more primeval state took a folksy if less articulate form, in the elemental rhythms of jazz, more than half a century ago. What made this idea suddenly erupt again, with almost volcanic power, into Western society was its incarnation in the Beatles. It was not just the sudden success of the Beatles' musical records that indicated that a profound change was taking place in the minds of the young: it was their new personality, as expressed in their long, neo-medieval haircut, their unabashed sentimentality, their nonchalant posture, and their dreamlike spontaneity that opened up for the post-nuclear generation the possibility of an immediate escape from megatechnic society. In the Beatles all their repressions, and all their resentments of repression were released: by hairdo, costume, ritual, and song, all changes depending upon purely personal choice, the new counter-ideas that bound the younger generation together were at once clarified and magnified. Impulses that were still too dumbly felt for words, spread like wildfire through incarnation and imitation.

The spread of a new gospel through visible personalities often characterizes the emergence of a new cultural epoch. There were many Messiahs and Teachers of Righteousness, both genuine and false, both before and after the coming of Jesus Christ.

But note: the newly incarnated personality, be it Buddhist or Liverpool – Dionysian, cannot survive alone, narcissistically gazing at its own image. Like a single biological mutant, the idea would be doomed unless similar impulses were beginning to find a corporeal form in thousands of other personalities: it is only by this general readiness, in fact, that the formative idea can imprint itself, by direct contact and emulation, upon a sufficient body of disciples and followers before the idea itself in more purely verbal form can be understood. Whitman spoke for all participators in this process when he said "I and mine do not convince by arguments: we convince by our presence." Proverbially it is by living the life that one knows the doctrine: by first taking bodily shape the idea begins to spread throughout the community by bodily imitation before it can be more effectively defined by word of mouth and in intellectual formulations.

It is through the maturation of ideas, in the daily experience of living, that the gap between the original 'apparitions and intuitions' and the realities of social life which other men participate in is bridged. This state of formulation and ideation and elaboration may be identified with the oral teachings of the great master, the memorizing of their words by disciples, as in the Confucian Analects, Plato's Dialogues, or the Christian Gospels, and their final fixation in books. At this point the unique insights of the incarnation become strengthened by many others ideas that are already either part of a stable tradition, indeed a system of education, or are still in the 'air.' As with the incarnation, the formative ideas, in order to remain alive, must be re-thought and re-tested by fresh experience from generation to generation.

The next stage, toward a wider socialization of the idea, may be called 'incorporation': at last the original formative impulse is re-enforced by conscious rational effort throughout the whole community, manifesting itself in the habits of family life, the customs of the village, the routines of the city, the practices of the workshop, the rituals of the temple, the legal procedures of the court. Without this general social adoption and modification, the formative idea, even if widely incarnated, would lose its authority and efficacy and indeed it was the weakness of Christianity in extending its moral principles to organized government, its reluctance to come to grips with slavery and war and class exploitation that, despite the immense energies it released in other departments, was responsible for its loss of impetus, its inner corrosion, and its failure to achieve the universal brotherly society it proclaimed.

Karl Marx properly recognized how effective a role the organization of the materials of production (technology) played in molding the human personality. But he made the grave error of treating economic organization as an independent, self-evolving factor, immune to active human intervention; whereas this form of materialization is but one of the many ways in which the fermenting ideas of a culture become accepted, regularized, carried into general daily practice. In this respect, perhaps the high point of Christian social achievement came relatively late in the Middle Ages, when its monasteries, almshouses, orphanages, and hospitals were to be found in every city, on a scale hitherto unknown.

It is by institutional extension that subjective impulses cease to be private, willful, contradictory, and ineffectual, and so become capable of bringing about large social changes. This transformation both releases

new potentialities and may disclose, if it fails to take corporate form , unexpected defects. Martriarchy in one age, kingship in another, divine redemption and salvation in a third, must be incorporated into every institution and influence every collective action, if the formative ideas underlying a culture are to flourish sufficiently and hold their own against the mass of residues and encrusted material survivals, still tenacious and often powerful. Since the existing institutions have a past that antedated the new idea and incorporated values and purposes of a different nature, it is in this third phase that many further modifications will be made, contributing ingredients that were lacking in the original proposals. Yet at the same time it is only by this act of incorporation that the assent and support of a larger population can be assured.

At this point of incorporation the new cultural form, for better and worse, loses some of its pristine clarity. Those who have fallen under the spell of a new vision, or who have sought to take on swiftly the mask of a new personality, often shrink from accepting this further mode of materialization: it seems at best a compromise, at worst a complete betrayal. Certainly by incorporation in existing institutions, the idea loses some of its original purity, if it does not in fact turn into its own antithesis through the very act of materialization.

Thus when the Roman state was converted to Christianity under Constantine, the Christian Church was also in some degree converted to paganism, and not merely tolerated many Roman practices, but even transferred the sadistic rituals of the Roman arena to the Christian conception of Hell, as an ultimate dispensation of Divine justice, making the spectacle of the eternal tortue of condemned sinners one of the supreme joys for the faithful in Heaven.

The final materialization of a formative idea, from its pre-conscious inception in many individual minds to a fully externalized and socialized state, shared by everyone, consists in the transformation of the physical environment, alike through practical means and symbolic expressions. This phase may be called 'embodiment.' First the plot is outlined, then the actors are chosen; then the actors put on their make-up and their costumes; then the scenario is outlined and the plot is developed; and finally new physical structures are built to express and support the idea.

Yet it is in these reconstituted physical structures that novel possibliities are revealed that were only latent in the original conception – quite untranslatable into more easily formed verbal, graphic, or musical symbols. Could Jesus Christ, the most spontaneous and informal of personalities, have guessed that the ultimate expression of Christianity would be realized in a formalized hierarchic organization, operating uniformly over the entire continent of Europe, and that the culmination of this worldly movement would be the widespread erection of cathedrals, churches, monasteries, whose technical audacity and esthetic vitality had no place in Jesus' intuitions? And yet, paradoxically, without the Christian idea there would have been no Durham, no Chartres, no Bamberg – and no Holy Inquisition! What better revelation could be offered of the unpredictablility of the future – as contrasted with the present method of extrapolating observable existing tendencies?

Though I have used a particular episode in Western history, the rise of the Christian Church, as a convenient example, the process summarized is a general one applicable with many variations to all cultures, not least to the triumph of the myth of the machine.

In putting together the phases of materialization in a serial form in time, I have ignored simultaneous phenomena, and have treated, as if they were separate and formally recognizable events, institutions, personalities, and ideas that were in fact in constant flux and interaction, undergoing both inner and outer transformations. So, for example, the incarnation of Jesus did not take place only once: for the Christian idea, to keep alive, needed further re-incarnations, always with fresh modifications, in the persons of Paul, Augustine, Francis of Assisi, and countless other Christian souls. In these changes the luminous original message lost, no doubt, some of its force, for the ideas suitable to a dying culture were irrellevant to the resurgent vitalities of later periods. Yet though both the institutional organization of the Church and its wealth of physical structures smothered the original flame it smoldered on – and astonishingly flared up again in our own late day in the person of Pope John XXIII.

One final aspect of materialization remains to be noted: a paradox. And this is that subjective expressions remain alive in the mind far longer than the corporate organizations and physical buildings that seem to the outward eye so solid and durable. Even when a culture disintegrates, the loss is never quite complete or final. From the total achievement much will remain and leave its imprint on later minds in the form of sport, play, language, art, customs. Though few Westerners have seen a Hindu temple, the Sanskrit root for mother and father still remains on their tongue in addressing their parents, more durable than any monument; and this symbolic debris of past cultures forms a rich compost for the

mind, without which the cultural environment would be as sterile as that of the moon. Andre Varagnac has demonstrated that an extremely ancient, orally transmitted culture, largely neolithic, perhaps even pre-neolithic in origin, passed on its magical beliefs, its sexual customs and marriage rites, its folklore and fairy tales to succeeding generations throughout the world.

This archaic culture still forms the buried underlayer of contemporary society. The games of ball played everywhere are survivals from the temples where, in religious ritual, the ball represented the sun, and the opposing players stood for the forces of light and darkness. The notorious recrudescence of astrology and witchcraft today is only the latest example of this subjective persistence. Even when all the material properties needed for a wornout drama have disappeared, some vestige of the play itself will nevertheless remain in proverbs ballads, musical phrases and melodies reverberating from generation to generation: more durable in the spoken word than if incised in stone. If the great pyramids of Egypt seem an exception, one must remember that, for all their solidity, they were symbols of the Mountain of Creation, of the yearning for immortality, of the desire to transcend time and organic corruption.

The counter-process to materialization I have chosen to call 'etherialization,' but since Arnold Toynbee has used the latter term in a more limited sense I should perhaps make clear a certain difference. In 'A Study of History' Toynbee pointed to a tendency visible in both biological and social development, toward a diminution in size and increasing simplification, going along with a higher degree of internal organization and refinement. Witness the passage in evolution from the giant empty-headed reptiles to the small brainy mammals, or from the lumbering cathedral clocks of the fifteenth century to the exquisitely compact and accurate watches of the twentieth. In a rough way, this generalization holds: yet Toynbee ignores the equally significant contrary process that I have been describing, which proceeds in the opposite direction. For that part of the process which Toynbee indicates I would prefer to use the term 'de-materialization.'

Following the mode of etherialization, the tangible visible world is translated progressively into symbols and reorganized in the mind. In 'Technics and Human Development' I endeavored to outline the natural history of this process: so here I purpose only to describe how a once fully embodied culture becomes de-materialized, and thus opens the way for a new constellation of formative ideas, which themselves come into existence partly by reaction against the dominant culture, and yet are constantly conditioned, and even temporarily supported by the very customs and institutions they seek to replace.

When the organizing idea of a culture has been fully explored, when its drama has been played out and all that is left of the original creative impulse is a soul-deadening ritual and compulsory drill, the moment for a new formative idea has come. Against such a change, however, the whole body of entrenched institutions presents a solid wall; for what is an institution but a closed society for the prevention of change? Hence the path of etherialization, so far from beginning with a new idea, starts at just the opposite end by attacking the visible structures and organizations which, so long as they remain in good working order, allow no place for a new idea to take hold.

The path of etherialization, then, is often opened up by a breakdown that invites this assault. At first this is mainly a physical breakdown which exposes the technical ineptitude or human insufficiency of a seemingly prosperous society: wars and the physical improverishment and destruction that wars produce, along with the depletion of life. Epidemic diseases and environmental degradations, soil erosion, pollution, failure of corps, outbreaks of criminal violence and psychotic malevolence – all these are symptoms of such disorganization, and they produce further social lapses; for the people affected, feeling cheated and oppressed, refuse then to perform their old duties or make the daily efforts and sacrifices always needed for keeping the mechanism of society moving.

What has brought on these breakdowns usually turns out to be due to a radical failure in feedback: an inability to acknowledge errors, and unwillingness to correct them, and a resistance to introducing new ideas and methods that would provide the means for a constructively human transformation. If once recognized, many of the defects that eventually undermine a society could be corrected, provided that prompt action were taken with the agents already at hand; but failing this, a more dire pathological situation, demanding surgery rather than diet, comes into existence.

For these reasons the first manifestation of etherialization, though it issues from subjective disillusion and disenchantment, does not take place on the level of ideas: it begins rather with an assault upon visible buildings, in acts of iconoclasm and destruction. Sometimes this takes the form of an organized physical attack; sometimes, as was the case with the Christian

rejection of the great Roman monuments, it shows itself by a desertion of the old structures, as the Christians deserted the arenas and public baths and established themselves in other buildings on other sites. Obviously the visible forms of a society are easier to identify – and to demolish – than the underlying ideas and doctrines, which may be maintained in the mind, as the Jews secretly kept to their ancient rites even in Catholic Spain. But the burning of books and the tearing down of sound buildings undermine confidence in continuity. Remember the Bastille!

Though materialization is necessarily a slow process, de-materialization works fast: even the cessation of work on new structures, or their rebuilding in a new style, as the daring Gothic constructions displaced the ponderous romanesque forms, constitutes an action that, as in the proverb, notoriously speaks louder than words.

When the dismantlement has gone far enough, the way is open for the positive forces of etherialization: for the ground is sufficiently cleared. At this point the furnishings and draperies of the existing society will begin, for all their shiny newness, to seem old-fashioned; and the apartments that were once reserved for the elite will be advertised for occupancy by new tenants – who ironically will either build different quarters for themselves elsewhere, or will take possession of even more ancient structures and convert them to their new purposes; as the mansions of the aristorcracy in London, Paris, and Rome have been converted into business offices, hotels, establishments for the higher bureaucracy.

There is no need to provide further specific historic examples of etherialization. Again, as in the behavior of organisms, the integrating and disintegrating processes take place side by side, not without affecting each other. To follow the course of etherialization one has only to read the serial analysis of materialization backward, beginning with debuilding and dismantling, and finally returning to the initial stage where a change of character and life-style becomes visible, to reach the point at which a formative idea again emerges. For when the negative phase of etherialization has gone far enough, a new constellation of ideas, a new world picture, a new vision of human possibilities, will take possession of a whole culture, and a different cast of characters will occupy the center of the stage and present a new drama.

If, on the other hand, the processes of disillusion, alienation, dismantlement, and destruction go further, if no counter-balancing modes of etherialization become effective, disintegration will, it seems probable, go on with increasing swiftness until no restorative measures are possible. In this case, the forces of anti-life will be in the ascendant, and the actors who seize the center of the stage and profess to represent the Living Theater will be incarnations of the absurd, the sadistic, the cruel, and the paranoid, whose mission will be to give the final sanction of their own insanity to the dehumanization achieved by the Power Complex.

Fortunately there already are many indications, though scattered, faint, and often contradictory, that a fresh cultural transformation is in the making: one which will recognize that the money economy is bankrupt, and the power complex has become, through its very excesses and exaggerations, impotent. Whether this change is as yet sufficient to arrest further disintegration, still more whether it can successfully dismantle the nuclear megamachine before it brings on a total human catastrophe, are matters that may long remain in doubt. But if mankind overcomes the myth of the machine, one thing may be safely predicted: the repressed components of our old culture will become the dominants of the new one; and similarly the present megatechnic institutions and structures will be reduced to human proportions and brought under human control. Should this prove true, the present canvass of the existing society, its technological miscarriages and its human misdemeanors, should by implication give valid positive directions for working out a life-economy.

If this schematic outline of materialization and etherialization holds, it should apply equally, of course, to the formative ideas of science and technics, and their subsequent translation into our present power complex.

What were only fleeting intuitions of new mechanical inventions in the mind of Roger Bacon's contemporaries in the thirteenth century became a well-defined group of ideas in the works of a galaxy of seventeenth-century thinkers from Campanella and Francis Bacon to Gilbert, Galileo, and Descartes. In the archetypal figure of Isaac Newton, whose mathematical language was so novel and abstruse that it could be understood only by initiates, the new mechanical world picture appeared in its most clarified and glorified form. On this new ideological basis, the richer polytechnics of the Middle Ages, which always kept a place for subjective expressions, was restricted and diminished. The dreams of Kepler, Bishop Wilkins, John Glanvill, which extruded this human factor, were early projections of man's conquest over time and space.

If 'incarnation' played only a minor part in the transformation of science and technics, this was perhaps

because the very idea of personality was excluded from the automatons that served as models for the new world vision. In this mechanical realm, the human personality was an embarrassment to the new conception of 'objectivity': to eliminate this 'irrational' human factor was the common aim of both theoretic science and advanced technology.

In compensation, technics passed swiftly into the further stages of materialization: in a multitude of new inventions and modes of organization, the novel formative ideas of the power system became visible and operative. From the eighteenth century on, the ideal of mechanical regularity and mechanical perfection entered into every human activity, from the observation of the heavens to the winding of clocks, from the drilling of soldiers to the drilling of seeds in fields: from keeping commercial accounts to establishing the routine of study in schools.

In every department these habits were validated by enormous quantitative gains in productivity, provided the qualitative results were taken for granted. In our own time, the mechanical world picture at last reached the state of complete embodiment in a multitude of machines, laboratories, factories, office buildings, rocket-platforms, underground shelter, control centers. But now that the idea has been completely embodied, we can recognize that it had left no place for man. He is reduced to a standardized servo-mechanism: a left-over part from a more organic world.

If 'Technics and Civilization' and 'The Myth of the Machine' could lay no claim to originality in any other department, they at least have radically challenged, if not yet successfully undermined, the idea that the Power Complex evolved by itself through the action of external forces over which man had no control, and which his own subjective life could not affect.

If machines alone were sufficient to produce machines, if technological systems automatically proliferated by reasons of inherent forces similar to those that account for the growth and development of organisms, the outlook for mankind in the near future would be even blacker than that pictured either in Samuel Butler's quoted letter or i.. Henry Adams' later analysis. But if the power system itself was, to begin with, a product of the human mind – the materialization of ideas that had organic and human roots – then the future holds many open possibilities, some of which lie entirely outside the range of our existing institutions. If the fashionable technocratic prescriptions for extending the present system of control to the whole organic world are not acceptable to rational men, they need not be accepted. The pressing human task today is not to endure further misapplications of the power system, but to detach ourselves from it, and cultivate our subjective resources as never before.

If this seems an all but impossible demand, with the odds heavily in favor of the power system and against the human personality, one need only remember how absurd such a withdrawal, such a rejection, such a challenge seemed to most intelligent Romans before Christianity presented an alternative.

In the period of the first Toman emperor, Augustus (63B.C. – A.D. 14), the Roman power system, supported and extended by its massive engineering and military machines, had reached the height of its authority and influence. Who then guessed that the law and order of the Pax Romana were not so solidly established as to be virtually impregnable? Despite the earlier warnings of the historian Polybius, the Henry Adams of his day, the Romans expected that their economy that educated Romans for long regarded with contempt the insignificant Christian minority who deliverately withdrew from this system, who rejected their goods and disparaged their massive achievements in road building and sewage disposal no less than their dedication to gluttony and pornography.

What educated Roman guessed, at the time of Marcus Aurelius, that only two centuries later one of their best-educated minds, Augustine, a lecturer of note, thoroughly at home in the culture of the past, would wirte 'The City of God' to expose the iniquities of the whole Roman establishment and castigate even its virtues? And who then, in his wildest fancies, could guess that a while later Paulinus of Nola, a patrician, born to be a Roman consul, the highest political office open, would retire to a distant Spanish monastery at the height of his career, to cultivate his faith in the divine order and eternal life promised by Jesus; and so believing, would eventually sell himself into slavery in order to ransom from captivity the only son of a widowed mother? Yet that unthinkable ideological transformation took place and those unthinkable deeds actually happened.

If such renunciation and detachment could begin in the proud Roman Empire, it can take palce anywhere, even here and now: all the more easily today after more tha half a centur of economic depressions, world wars, revolutions, and systematic programs of extermination have ground the moral foundations of modern civilization to rubble and dust. If the power system itself seemed never so formidable as now, with one brilliant technological feat following another, its negative

life-mutilating counterpart has never been so threatening: for unqualified violence and crime in every form, pattern after the dehumanized examples of the Power Pentagon, have invaded what were once the most secure and inviolable human activities.

This is not a prophecy: it is a factual description of what is already happening before our eyes, with murderous confrontations and infantile tantrums taking the place of rational demands and cooperative efforts. Yes: the physical structure of the power system was never more closely articulated: but its human supports were never more frail, more morally indecisive, more vulnerable to attack.

How long, those who are now awake must ask themselves, how long can the physical structure of an advanced technology hold together when all its human foundations are crumbling away? All this has happened so suddenly that many people are hardly aware that it has happened at all: yet during the last generation the very bottom has dropped out of our life; the human institutions and moral convictions that have taken thousands of years to achieve even a minimal efficacy have disappeared before our eyes: so completely that the next generation will scarcely believe they ever existed.

Let us take a dramatic example of this collapse. What would the great proconsuls of the British Empire, the Curzons and the Cromers, have said if, in 1914, they had been informed that, despite all the statistical reports in the Yearbooks, their Empire would, within a single generation, fall to pieces – though at that very moment Sir Edward Lutyens was designing the imposing buildings of the new capital at Delhi and a great viceregal mansion, as if the Empire would hold together for countless centuries. Only Kipling, though the poet of imperialism, foresaw that ominous possibility in his 'Recessional.'

Could these empire builders have guessed, what is now so plain, that the most lasting effect of British imperialism, in its most humane expression as a Commonwealth of Nations, would be to open the way for a counter-colonialism and a counter-invasion of England by its once subject peoples? Yet all this has happened, with parallel reversals and humiliations already visible everywhere else, not least in the United States. If these outer bastions of the Pentagon of Power have been taken, how long will it be before the center itself surrenders or blows up?

The Roman Empire in the East won a new lease on life for a thousand years by coming to terms with Christianity. If the Power System is to continue in existence as a working partner in a more organic complex dedicated to the renewal of life, it will only be if its dynamic leaders, and those larger groups that they influence, have undergone a profound change of heart and mind, of ideal and purpose, as great as that which for so long arrested the decay of the Eastern empire established in Byzantium. But it must be remembered that this intermixture of Roman and Christian institutions was achieved at the expense of creativity. So until the disintegration of our own society has gone even further, there is reason to look for a more vigorous life-promoting solution. Whether such a response is possible depends upon an unknown factor: how viable are the formative ideas that are now in the air, and how ready are our contemporaries to undertake the efforts and sacrifices that are essential for human renewal? There are no purely technological answers.

Has Western civilization yet reached the point in etherialization where detachment and withdrawal will lead to the assemblage of an organic world picture, in which the human personaility in all its dimensions will have primacy over its biological needs and technological pressures? That question cannot be answered except in action. But the evidences for such a transformation have already been put forward.

To describe even in the barest outline the multitude of changes necessary to turn the power complex into an organic complex, and a money economy into a life economy, lies beyond the capacities of any indivuidual mind; any attempt at a detailed picture would be presumptuous. And this is so for two reasons: genuine novelty is unpredictable, except in such features as are recognizable in another form in past culters. But even more because the materialization of the organic ideology, though already well begun, will take as long to replace the existing establishment as the power system itself required to displace the feudal and municipal and ecclesiastical economy of the Middle Ages. The first evidences of such a transformation will present themselves in an inner change; and inner changes often strike suddenly and work swiftly. Each one of us, as long as life stirs in him, may play a part in extricating himself from the power system by asserting his primacy as a person in quiet acts of mental or physical withdrawal – in gestures of non-conformity, in abstentions, restrictions, inhibitions, which will liberate him from the domination of the pentagon of power.

In a hundred different place, the marks of such de-materizalization and etherialization are already visible: many more than I have felt it necessary to cite. If I dare to foresee a promising future other than that which the technocrats (the power elite) have been

confidently extrapolating, it is because I have found by person experience that it is far easier to detach oneself from the system and to make a selective use of its facilities than the promoters of the Affluent Society would have their docile subjects believe.

Though no immediate and complete escape from the ongoing power system is possible, least of all through mass violence, the changes that will restore autonomy and initiative to the human person all lie within the province of each individual soul, once it is roused. Nothing could be more damaging to the myth of the machine, and to the dehumanized social order it has brought into existence, than a steady withdrawal of interest, a slowing down of tempo, a stoppage of senseless routines and mindless acts. And has not all this in fact begun to happen?

When the moment comes to replace power with plenitude, compulsive external rituals with internal, self-imposed discipline, depersonalization with individuation, automation with autonomy, we shall find that the necessary change of attitude and purpose has been going on beneath the surface durying the last century, and the long buried seeds of a richer human culture are now ready to strike root and grow, as soon as the ice breaks up and the sun reaches them. If that growth is to prosper, it will draw freely on the compost from many previous cultures. When the power complex itself becomes sufficiently etherialized, its formative universal ideas will become usable again, passing on its intellectual vigor and its discipline, once applied mainly to the management of things, to the management and enrichment of man's whole subjective existence.

As long as man's life prospers there is no limit to its possibilities, no terminus to its creativity; for it is part of the essential nature of man to transcend the limits of his own biological nature, and to be ready if necessary to die in order to make such transcendence possible.

Behind the picture of fresh human possibilities I have been drawing all through 'The Myth of the Machine' is a profound truth to which almost a century ago William James gave expression. "When from our present advanced standpoint," he observed, "we look back upon past stages of human thought, we are amazed that a universe which appears to us of so vast and mysterious a complication should ever have seemed to anyone so little and plain a thing. . . There is nothing in the spirit and principles of science that need hinder science from dealing successfully with a world in which personal forces are the starting point of new effects. The only form of thing we directly encounter, the only experience that we concretely have, is our own personal life. The only complete category of our thinking, our professors of philosophy tell us, is the abstract elements of that. And this systematic denial on science's part of the personality as a condition of events, this rigorous belief that in its own essential and innermost nature our world is a strictly impersonal world, may conceivably, as the whirligig of time goes round, prove to be the very defect that our descendents will be most surprised at in our boasted science, the omission that to their eyes will most tend to make it look perspectiveless and short."

The whirligig of time has gone round; and what James applied to science applies equally to our compulsive, depersonalized, power-driven technology. We now have sufficient historic perspective to realize that this seemingly self-automated mechanism has, like the old 'automatic' chess player, a man concealed in the works; and we know that the system is not directly derived from nature as we find it on earth or in the sky, but has features that at every point bear the stamp of the human mind, partly rational, partly cretinous, partly demonic. No outward tinkering will improve this overpowered civilization, now plainly in the final and fossilized stage of its materialization: nothing will produce an effective change but the fresh transformation that has already begun in the human mind.

Those who are unable to accept William James' perception that the human person has always been the "starting point of new effects" and that the most solid-seeming structures and institutions must collapse as soon as the formative ideas that have brought them into existence begin to dissolve, are the real prophets of doom. On the terms imposed by technocratic society, there is no hope for mankind except by 'going with' its plans for accelerated technological progress, even though man's vital organs will all be cannibalized in order to prolong the megamachine's meaningless existence. But for those of us who have thrown off the myth of the machine, the next move is ours: for the gates of the technocratic prison will open automatically, despite their rusty ancient hinges, as soon as we choose to walk out.

EDITORIAL: Are Physicists To Blame?

The urbanologist Lewis Mumford has just appeared in print with an essay, entitled *"Science and Technology,"* that has much to say about the them of this month's special issue on Physics and Environment. In may estimate, his views (which are published in four consecutive issues of *The New Yorker* starting 10 October) constitute the most sophisticated line of argument yet to be seen in support of the idea that science is to blame for the serious mess that modern technology is making of the environment.

His piece warrants the attention of physicists because he argues that in particular it was the logical-positivist view of science, introduced by Galileo and Descartes and championed by physicists ever since, that has shaped the design of the all-powerful Megamachine – the name that Mumford gives to the techno-economic system that he believes now autonomously rules the lives of unwitting citizens at all levels in modern industrialized society.

According to Mumford, the dazzling successes that physicists, starting in the 17th century, have been able to achieve by focusing on what can be concretely observed have inspired the collective mind to a religious veneration for technology in which the natural scientist had become "elevated to absolute lawgiver" and quantifiability has become accepted as the test of truth. The final result, Mumford argues, has been a society whose values are derived from a mechanical world picture, a world in which primary importance is reserved for things that can be measured or counted.

Although Mumford concedes that this priority of emphasis has led to an economic system that is extremely efficient in carrying out machine-like activities such as technological development, mass production and marketing of goods and services, he has assembled a wealth of historical data to show how the more subtle and complex human needs-those that can not easily be measured or even well defined but that distinguish humans from machines-have gradually been eliminated from consideration as the Megamachine has evolved to its present state of supremacy. Operating under the technological imperative (once something becomes technically feasible to do then the system must go ahead and do it), Mumford's Megamachine obliges him with no end of examples of how technical innovations have been pressed forward at the expense of the total human condition. The most recent example is the proposal to build a supersonic transport.

Few physicists would argue the point that the economic system has too often exploited technology in shortsighted ways. But are physicists really to blame for the fact that we have an overly materialistic society? There is, it seems to me, a grain of truth in Mumford's accusations. Let us grant, even as Mumford points out, that the prominent voices in physics (as far back as Galileo and more currently, say, Einstein and Oppenheimer) have typically belonged to individuals whose personal lives showed high regard for the humanistic concerns than is the average citizen. But in terms of what constitutes ultimate truth there is little question that we physicists have been the hard-core enthusiasts of the logical-positivist position.

The idea that this philosophical viewpoint could have played a fundamental part in shaping our cultural values may not seem so completely farfetched when we consider the inhibiting influence this philosophy has had on the "softer" sciences. For years biologists and psychologists have struggled to make their disciplines conform to the ideal model of objectivity they saw exemplified by physics. It is interesting that now, at a time when public interest is turning to the organic needs of life, we find that philosophers of science are concluding that the higher disciplines such as biology can not be reduced ultimately to the language and concepts of physics and should not be striving to this end. In fact the philosopher Michael Polyani has presented convincing arguments that logical positivism is overemphasized even in physics. He points out that the information from a physics experiment must always contain elements that involve tacit understanding on the

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part of the observer. Laplacian determinism in his view is not a legitimate goal for *any* of the scientific disciplines.

But on a more practical level the point at which other disciplines and perhaps the whole culture have been misled is embodied in the notion that to be truly objective and scientific one's observations must yield numbers that can be manipulated with mathematics. There is nothing doubt the scientific method that requires the data be quantitive as opposed to qualitative. Charles Darwin did very well without using mathematics and so can many modern investigators. As the recognized expositors of the scientific method, we physicists could perform a service by making this point clear first to ourselves and then to a wider part of the intellectual community.

PERSPECTIVE

"ANOTHER" PHYSICIST – FROM THE PAST

"I do not know what I may appear to the world, but to myself I seem to have been only a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me. . ."

– Sir Isaac Newton
(1642-1727)

THE BIOLOGIST, THE PSYCHOLOGIST, AND THE ENVIRONMENTAL CRISIS

By Robert G. Franke

Our world may be saved from overpopulation, starvation, pollution, resource depletion, and the other challenges of our current ecological crisis. If so, the biologists must be credited with sounding the alarm. The abundance of current descriptive articles and books by biologists demonstrate that they know well where the environmental troubles are, and are eager to tell others.

It would seem that mere recitation of impending natural disaster would bring effective response to the alarm. Some biologists propose solutions to these troubles, but the immense and far-reaching problems require the concern and expertise of both scientists and nonscientists. The challenge demands conceptualization of problems and implementation of solutions, issues transcending the scope of any single discipline such as biology. So far we have heard from the physical scientists and a few others, such as economist Kenneth Boulding (1966), historian Lynn White, Jr. (1967), landscape architect Ian McHarg (1969). and lawyer Raymond Haik (1970). Nonetheless, assuming man's future is at stake, where are the experts from other fields?

Solutions to our environmental crises demand a new and broader understanding of our decisions involving commitment and action. A reading of *The Art of Loving, The Sane Society,* and *The Revolution of Hope* by Erich Fromm strongly suggests the need for the contribution of this humanist psychologist in attaining such understanding. Psychologist Fromm discusses the impact of forces in the American social environment on individual mental well-being, a crucial factor in any crisis. He considers causes for much individual, social, and national discontent.

Fromm's discussion of this discontent also appears to explain causes of our environmental problems, and thus to speak to biologists concerned with our earth's deterioration. Biologists have described well the ecological crisis, but they do not have the disciplinary resources to examine the human causes of our dilemma. For them, Fromm suggests that the causes of our environmental problems may be identical to those affecting other situations characterized by massive individual and group discontent in our society. Fromm (1955) argues convincingly that "... man has lost his central place, that he has been made an instrument for the purposes of economic aims, that he has been estranged from, and has lost the concrete relatedness to, his fellow men and to nature, that he has ceased to have a meaningful life." In other words, modern man suffers psychological deprivation, and man who is psychologically deprived is ill-suited for purposeful decision-making in dealing with our environment.

Fromm (1955) defines the implications of this psychological state.

> ... man regresses to a receptive and marketing orientation and ceases to be productive; ... he loses his sense of self, becomes dependent on approval, hence tends to conform and yet to feel insecure; he is dissatisfied, bored, and anxious, and spends most of his energy in the attempt to compensate for or just to cover up this anxiety. His intelligence is excellent, his reason deteriorates and in view of his technical powers he is seriously endangering the existence of civilization, and even of the human race.

In short, "alienated man" may comprehend the environmental crisis without mobilizing commitment to attain ecological balance. Have not biologists themselves experienced frustration in moving from their own comprehension to gaining public support for action in coping with environmental problems?

Fromm's analysis of the alienating and mentally debilitating forces rife in our contemporary society suggests that the relationship between biology and psychology extends beyond the biologists' frustration in trying to improve conditions. Man's unique evolutionary product, his psychological apparatus, has created a life-sustaining balance between him and his environment.

"The Biologist, the Psychologist, and the Environmental Crisis" by Robert C. Franke. BIOSCIENCE 1971 Reprinted by permission American Institute of Biological Sciences.

Biologists know any serious imbalance in that relationship between any organism and its environment, even for a short time, often leads to the extinction of the organism. The natural law applies to man's situation as well. Consequently, though societal forces affecting man's ability to adapt at first appear to be the psychologist's business, they also must become the biologist's concern.

Biologist-anthropologist Ashley Montagu (1969) already has expressed concern that elements in our contemporary society work against human fulfillment in a healthy environment. He fears the effect on the human psyche resulting from increased rate of population growth, a seemingly fortuitous consequence of our material production.

> Perhaps the greatest havoc wrought by the pressures of population has been the damage to the human spirit, disabling millions of human beings from the ability to preceive and to feel as human beings. Conditioned in a world which takes an exaggerated value upon things, these persons take such things for granted, perceiving what they see only as things, not in the least in the context of the human situation, in the context of the necessity of beauty, and scarcely ever being humanly affronted by them. On the other hand, they rejoice in the great highways and freeways that have brought about the destruction of millions of trees, the annihilation of parklands, farmlands, meadows, orchards, and the wilderness. And to what end? So that the slums of the immediate future may replace them in order to house the millions who will require the sewers, the gasoline stations, shopping centers, hot dog stands, drive-ins, and other desecrations of the landscape which, like a cancerous growth, spread over the length and breadth of the land destroying everything beautiful or potentially beautiful in their path.

National economic growth itself, which Fromm and many other social scientists agree has been an essential rationale of modern society, has now become a concern for ecologists such as Paul Sears (1969).

> . . . most dangerous. . . is the confusion of growth with health. These, as nay biologist knows, are two very different phenomena. Growth, whether of size or numbers, is a determinate process, self-limiting. Otherwise, it exceeds the capacity of organization and becomes pathological. I am immensely disturbed to see the vitality of the American nation measured only by the growth of the Gross National Product, the expansion of urban industry, or the avalanche of new customers.

Efforts of these and other authors indicate that the destruction of the vital balance between man and environment can be related to some of the forces within our socioeconomic system which Fromm believes threaten contemporary man psychologically.

Fromm limits his discussion to forces within the American socioeconomic system. However, environmental problems are worldwide. Thus social forces which influence the environmental crisis may not be limited to the United States. After all, Communist USSR suffers smoggy air and water pollution, as do Japan and the United States. On the other hand, the causes of our own crises are not necessarily those found elsewhere despite similar consequences. In any case, Fromm concentrates on our problems and looks closely only at the socioeconomic system in the United States.

Fromm admits our economic system has yielded incredible material benefits. Yet this system also has produced conditions which he maintains now work against human fulfillment, if not against existence itself. As a psychologist, he worries that the "good life" deprives modern man of his central place, uses him to attain economic goals, estranges him from his fellow men and nature. Man-made environment may have become an end in itself, out of kilter with nature. Thus, the irony is that man-made environment may now threaten humanity.

What are some forces within our socioeconomic system which keep man from a fulfilled existence? Among others, Fromm lists our preoccupation with monetary profit, technological change, mass production and mass consumption, the rise of living standards, development of management and quantification and abstraction of reality. Fromm details the psychological effects of these forces on man. His ideas can be related specifically to ecological issues to illustrate this. Through the forces within our society negatively affecting man's psychology and possibly our ecology are parts of a whole and closely related, each can best be discussed individually.

1) *Monetary profit.* Biologists frequently find themselves in the "no-man's land" between money-making industry and nonprofit conservation organizations. The struggle to save the Redwoods in our Northwest, the canoe country in Minnesota, the wolves in Alaska, the dunes in the Great Lakes states, or the air and water near industrial areas is fought between industry, oriented toward profit in dollars and

short-range goals, and nonprofit interest groups, concerned with preservation for generations ahead.

The pursuit of profit is itself a source of environmental destruction. For individuals, it is also a threat to mental health because, according to Fromm, profit-making for its own sake often sacrifices personal involvement and human creativity. Individuality becomes subordinated to monetary values. Perhaps this loss of individuality dulls our creative sensitivity when we are confronted with the often competing values of immediate profit and conservation.

2) *Technological change.* Intertwined with the profit motive are the rapid technological changes which have independently imperiled our national environment. Consider the internal combustion engine. Many argue that no single invention advanced by industrial capitalism has so decisively structured our modern society. Now we know it may also decisively structure our physical environment to the detriment of society.

Each year motor vehicles discharge 66 million tons of carbon monoxide, 1 million tons of sulfur oxides, 6 million tons of nitrogen oxides, 12 million tons of hydrocarbons, and 1 million tons of particulate matter plus fuel additives such as tetra-ethyl lead (U.S. Dept. HEW, 1968). Sooner or later the resulting smog is deadly. The incidents at Donora, Pa., in which one-third of the town residents became ill and 20 died during the 1948 smog, and at London, England, in December, 1952, in which 4000 more deaths than usual occurred during the 5-day smog siege, and 8000 excess deaths occurred during the next 2 months (Iglauer, 1968) indicate that the danger is real and not the hysteria of "nervous Nellies." The sudden increase of emphysema from an incidence of 1.5 to 8.0 males/1000 between 1950 and 1959 in California (Lienwand, 1969) is highly correlated with an increase in severity of its smog problem. Furthermore, because pollution damage is subtle, there may well be deleterious effects on the body which are yet to be determined.

Remarks earlier in this paper advance the idea that failure to cope with environmental destruction, a direct result of modern technology, may be a kind of psychological alienation. Fromm, concerned with the rapid replacement of manual labor with machine work and human intelligence with machine intelligence, elaborates this point. About psychological alienation he says (1955),

> Alienation as we find it in modern society is almost total; it pervades the relationship of man to his work, to the things he consumes, to the state, to his fellow man, and to himself. Man has created a world of man-made things as it never existed before. He has constructed a complicated social machine to administer the technical machine he built. Yet this whole creation of his stands over and above him. He does not feel himself as a creator and center, but as the servant of a Golem, which his hands have built. The more powerful and gigantic the forces are which he unleashes, the more powerless he feels himself as a human being. He confronts himself with his own forces embodied in things he has created, alienated from himself. He is owned by his own creation, and has lost ownership of himself. He has built a golden calf, and says, "these are your gods who have brought you out of Egypt."

3) *Mass production and mass consumption.* Biologists concerned with the interdependence of ecological factors are increasingly alarmed with the results of our national dependence on mass production and mass consumption. Consider that the output from each of California's 18.5 million residents averages 20 pounds of solid garbage per day would reach from Oregon to Mexico in a column 100 feet wide and 30 feet high! *(Time,* Feb. 2, 1970).

Not only are we faced with the disposal of waste, but with the exhaustion of natural materials used to make the waste. The resulting ecological problem is immense now, and becoming worse. Consider raw materials needed for cars. More than 90 million vehicles are estimated to have been on the roads of the United States in 1968. By the year 2000, 240 million vehicles are expected.

However, is mass production and mass consumption simply an issue of ecological balance? As an issue of balance between production and consumption in the lives of individuals, how might man most providently organize his behavior? Fromm's description of appropriate consumption (1955) differs greatly from that now practices in our culture:

> . . . the act of consumption should be a *concrete* human act, in which our senses, bodily needs, our aesthetic taste – that is to say, in which we as concrete, sensing, feeling, judging human beings – are involved; the act of consumption should be a meaningful, human, productive experience. In our culture, there is little of that. Consumption is essentially the satisfaction of artifically stimulated phantasies, a phantasy performance alienated from our concrete, real selves.

Thus ecological balance, and healthful balance between production and consumption in individual lives, may be congruent needs. Perhaps the biologist and

psychologist might profitably ask one another, "Which need comes first?"

4) *Development of management.* The theme of exploitation underlies man's status in interpersonal relationships as well as his relationship with his environment. Exploitation of the environment to serve man's needs has occurred since he appeared on earth. Unfortunately, today the willingness to conquer and exploit the natural environment appears to be a manifestation of a national attitude, a cultural characteristic perhaps carried over from only recently settling the frontiers of a new country influenced by a Western religious heritage emphasizing acquisition and mastery of nature (White, 1967). As a result, today 10% of all mammals in the world are in danger of extinction (Ehrenfeld, 1970), many in this country; natural wonders such as the magnificent Grand Canyon and the Everglades have been recklessly threatened; and most critically, life-giving natural resources, such as fresh water, have been gravely depleted.

Fromm points out that we must now understand that such exploitation for the sake of mankind encompasses the exploitation of man himself. Such a threat Fromm interprets as a natural result of a new decision-making apparatus resulting from the rise of management in out society.

Fromm describes how the simultaneous development of the American economy and American industry produced today's industry, a large and potent social institution. Characteristically, the internal structure of industrial organizations is hierarchical, involving managers and subordinates. To properly perform their functions, managers must make efficient use of "personnel" – other humans as instruments in the industrial process. Often managers handle subordinates like chess pieces. The replacement, or relocation of subordinates in another geographical area, may be "good business," but such practices also uproot families break friendships, and interrupt children's education. In short, the organizational structure of industry requires that man be manipulated. He becomes "man, the thing." The uniqueness of each human being becomes too often only a liability in the activity of "the system."

Fromm says (1955):

> In the capitalistic hierarchy of values, capital stands higher than labor, amassed things higher than the manifestations of life. Capital employs labor, and not labor capital. The person who owns capital commands the person who "only" owns his live, human skill, vitality and creative productivity. "Things" are higher than man. The conflict between capital and labor is much more than their fight for a greater share of the social product. It is the conflict between two principles of value; that between the world of things, and their amassment, and the world of life and its productivity.

Fromm's remarks may not uniquely describe capitalism or even industrial society. Nevertheless, as long as our society easily allows us to exploit one another, what is to restrain us from exploiting our less personal physical environment?

The psychological ramifications of such exploitation may be still deeper. Biologist and poet John Hay (1970) says:

> To the degree that we become disassociated by our power to exploit from what it is we exploit, so our senses will become atrophied, our skills diminished, our earth-related vision hopelessly dimmed. Without a new equation in which natural and human need are together in eternal process and identity, we may be lost to one another, and starved of our inheritance.

What are the implications to the biologist of all these concerns? The necessity of maintaining a life-giving relationship between man and his environment in face of social forces which may threaten the individual's well-being suggests biologists would do well to inquire into the nature of adequate fulfillment of man's psychological needs.

To a biologist, "needs" probably mean physiological drives to obtain food or sex, as examples. However, any discussion of the human faculties needed to maintain a vital relationship with the environment suggests the biologist extend his vocabulary to include the terms used by the humanist psychologist in defining human needs. Such a vocabulary would include substantive, even emotional, aspects of reality, characteristics of life which a biologist does not normally consider his domain.

Granted this vocabulary, what are the needs, and means to their proper fulfillment, which would insure a sounder psychological state, a healthier society, and make possible a balanced relationship with the environment? When Fromm describes the dehumanizing forces rife in our society – preoccupation with profit, misguided technology, noncreative consumption, personally alienating managerial organization, and depersonalized quantification of reality – he is suggesting that these forces represent inadequate basic psychological adjustment which in turn results in alienation. He says (1955):

> By alienation is meant a mode of experience in which the person experiences himself as an alien. He

> has become, one might say, estranged from himself. He does not experience himself as the center of his world, as the creator of his own acts – but his acts and their consequences have become his masters, whom he obeys, or whom he may even worship. The alienated person is out of touch with himself as he is out of touch with any other person. He, like the others, is experienced as things are experienced; with the senses and other common sense, but at the same time without being related to oneself and to the world outside productively.

Is not the humanist psychologist arguing for individual fulfillment by restructuring these societal forces which may encourage schisms between the individual and his environment? Is he not also saying that the primary concern must be with man and his uniquely human attributes? If this message can be drawn from Fromm, it implies that the psychological apparatus which accompanies intelligence must be allowed to dictate the decisions involving commitments to values and actions. It also implies that man must sense again the power to direct his own fortune. Rollo May, another eminent humanist psychologist, say (1970): "Indeed, the central core of modern man's 'neurosis'... is the undermining of his experience of himself as responsible, the sapping of his will and ability to make decisions."

What aspects of man must be catered to in order to restore his potency? Using the concepts of the humanist psychologist, Fromm describes the human needs which require healthful fulfillment. His ideas may be useful to the biologist, for from him we may infer that necessary to solving environmental problems, we human beings, biologists included, need to be sensitive toward organisms, notably our fellowmen. We need to be self-aware, and dedicated to the healthful employment of human abilities in ourselves and others, and open to our life experiences.

Fromm is more specific. In the vocabulary of the psychologist he describes the "humane experiences" necessarily a part of the life of a healthy individual. These experiences are beliefs, feelings, and attitudes. Feelings include tenderness and empathy, attitudes encompass self-awareness and transcendance, beliefs embrace a faith in events to be.

The intent here, however, is not to dwell on Fromm's ideas for their own sake, but rather to emphasize that if the symptoms of distress in our society, including the crises in our environment, are linked to the lack of proper meeting of psychological needs, then Fromm speaks not only to the psychologists but to the biologists as well.

Today the biologist concerned with the irrationality of our past and present environmental policies, manifested in increasingly serious ecological problems, must develop an intellectual strategy. He can either attack only the well recognized symptoms of an endangered relationship between man and the natural environment, or while preventing more despoliation, he can rally to change detrimental societal forces through attention to man's psychological needs.

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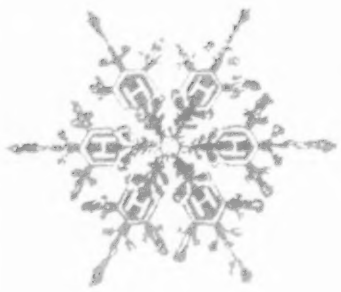
THE STATE OF THE SPECIES – 1971

"The source of the human (and hence cultural) problem is an irony – man is born an *individual, social* animal. In that contradiction lies the basis of our neuroses, our social problems, our moralities and immoralities. Since intelligence is brought to the survival of both the individual organism and the species, it is possible for the individual to act in what seem to be his own interests at the very time he is acting against the interest of the species. It is this irony that every society must, with one degree or another of success, organize itself to deal with. . ."

– Paul Bohannan



Beyond Civilization

ON THE PAST, PRESENT, AND FUTURE OF MAN

By Paul Bohannan

A Natural History Magazine Special Supplement

The intense crisis that threatens the world we live in seems to have come upon us so suddenly that it is understandable that we frantically search for immoralists to blame or scapegoats to sacrifice. When we were children, and when some of us were young adults, we saw a disturbed world before us, but at that time the malady was focused to that it seemed to be the result of human error – we could still blame individuals, specific leaders, specific peoples. There was little to indicate to us, in our innocence, that civilization itself was threatened – that we were witness not merely to human moral weakness and error, but to an overwhelming evolutionary process. Yet today we know that civilization itself is threatened – threatened by itself.

But which civilization? We must repeatedly ask what civilization itself is. Not just our civilization, but civilization as a process: what it provides for us and what its future may be. To examine the crises of civilization one must go back to the idea of culture, and man's use of culture as his device for adapting to the world he lives in. Culture is the technical term, coined by anthropologists in the nineteenth century, to refer to the "artificial" extensions of the human being that allow him greater control over his own environment, over his social system, and ultimately, over himself. Culture is, to make an analogy, what the medical men call a prosthesis – an extension of the animal that makes it possible for him to do things he could not otherwise do. Artificial limbs, false teeth, and eyeglasses are common prostheses in the modern world. But by analogy all of culture can be seen as the prosthesis of the human being – an animal who specialized in brain and central nervous system and developed, through their use, extensions of himself that allowed him to remain an otherwise non-specialized animal, without built-in fighting equipment such as claws or horns or canine teeth; protective devices such as fur, natural camauflage, or fleetness; indeed, without any other form of physical specialization to give him any great advantages toward survival.

Culture, in other words, comprises all the things and devices – including the nonmaterial, such as myths and beliefs and stories – that human beings create to enhance, protect, or express themselves. Culture has, in the course of evolution, become the peculiar (but not unique) property of human beings, and human specialization in culture (like the specialization of tigers in saber teeth or of giraffes in long necks) has been the means by which man has survived and aggrandized himself on the planet. By it he must (and will) either survive or perish.

Today we know that culture is a two-edged sword. The very while that it allows us to express ourselves more fully, to explore social organization more broadly, and to master our environment more thoroughly, it creates situations of alienation, tyranny, and ecological imbalance. It seems an irony when we realize that only by cultural means can man overcome the evil effects of culture and yet retain the good effects. Once he has started on this road, man must learn more about how to get from himself the best and most enjoyable of lives; he must learn more about human social organization and how to control it without what we see as immoralities, even when we do them; and he must learn more about the physical world in which he lives so that his accomplishments will not so alter the earth as to make it uninhabitable.

Man, through several million years of evolution, is committed to living as a cultural being. Only in the last few decades have we realized that culture must be controlled by man himself, and his evolution altered to special kinds of cultural activities, if he is not to become extinct from overspecialization – from blind

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overspecialization in culture. There is, at this stage of the game, literally no answer except to treat the blindness, to have the courage to see.

The source of the human (and hence cultural) problem is an irony – man is born an *individual, social* animal. In that contradiction lies the basis of our neuroses, our social problems, our moralities and immoralities. Since intelligence is brought to the survival of both the individual organism and the species, it is possible for the individual to act in what seem to be his own interests at the very time he is acting against the interests of the species. It is this irony that every society must, with one degree or another of success, organize itself to deal with.

But even the organization is ironic, for no two intelligences see it quite the same way. Since man is a social animal and has opted for a cultural mode of self-preservation, all human social groups consist of parties (sometimes individuals, sometimes small groups) interacting in terms of the available culture. Each social group – from the family to the nation, indeed, from the marriage or the mother-child relationship to the United Nations – has a cultural tradition. That tradition changes as new cultural items are invented by members of the group, or as member of the group come into contact with other people whose repertoires of cultural items are different from their own. Therefore, culture is not only handed on from generation to generation, it is also handed "sideways" from one social group to the next. In today's world, we live in a culturally privileged time because items from so many different cultural traditions are available to large numbers of people – indeed, prosperity can in one sense be gauged by the kind and amount of human culture available to a group. But so, obviously, can the potential for disaster. Culture grows as the group flourishes, and the group grows in size as culture flourishes. And then, suddenly – at least it always seems sudden – there is a vast disparity between the capacities of the available culture and the group it serves. The culture that was adequate for yesterday is inadequate for today and disastrous for tomorrow. If there is a law of culture, that is it.

And so it has always been. But today our ironic harvest seems particularly bitter because there is so much *good* culture, judged by our own inward awareness of what is good for us. And, worse, the bad culture is an epiphenomenon, or so it seems. Slowly we must realize that the problem of evil is with us again. In Roy Rappaport's words, it takes the form of the "evolution of maladaptation."

Actually, of course, the problem of evil was never absent, but for a while evil seemed to be attached to individuals, to institutions. And now, again, we see it as the other side of our natures – all our natures. In spite of villains, I too have an evil dimension. Existing culturally creates evil. Culture is, indeed, as the Genesis myth puts it, the knowledge of good and evil. We were thrown out of the garden we wish had once existed into a hell we wish did not.

For the dynamics of culture work in ways that are beyond the purposes of men, whatever they may be. Culture becomes something in itself, something beyond man. Ultimately, it becomes, in the inspired phrase of Jules Henry, culture against man. One's own prostheses turn on one's very self. That is the price one must always pay for prostheses, medicines, drugs, or even love.

When a small group of human beings adapts and successfully adjusts to its environment, the group survives. If its adaptation is unsuccessful, the group perishes: to survive, its members change and adapt in different groups, or they too will perish. If the cultural adaptation is successful, then the group is safe, its members perhaps comfortable. In response to the animality in us and to thousands of millions of years of evolution, the group, in its comfort, grows larger. As the group grows larger the available culture is "stretched" – it is like putting water in the soup to feed unexpected guests. Such diluted culture does not serve as it once did; the situation is no longer that for which it was designed and in accordance with which it evolved.

Three things can happen when culture is stretched too far: the population growth can be checked, either by a natural disaster of some sort or by a population policy; the group can break into two or more groups that separate, and each of them can begin again the process of achieving first optimum, then maximum, and finally destructive growth; the third choice is to invent new culture – new ways of coping with the environment, new ways of dealing with each other, of experiencing the human animalness of us.

Obviously, only those groups that choose the last way survive in the long run. Breaking into several groups, cell-fashion, works only so long as the ecological carrying capacity of the world is not seriously affected.

Thus the real problem arises because man is clever and can devise ways and means of beating the system – for short periods of time. The use of fire, the use of metals, the use of more complex hierarchies to achieve larger social organizations, all of these cultural discoveries and many others have allowed larger social organizations, all of these cultural discoveries and many

others have allowed larger populations to survive and multiply, outgrowing the culture that spawned them, and in a sort of cultural Malthusianism, creating worse problems than they solved. Worse because so many more people are involved, and because they are more helpless the further they are removed from a simple ecological position in nature: man as a hunter and gatherer was just another animal.

Civilization

There comes a point in this continuous growth of culture when those traits emerge that characterize "civilization": a large enough population to have something resembling an urban agglomeration, a highly developed division of labor with concomitant specialization in a stratified society, food production rather than hunting and gathering, the form of government known as a "state," a calendar and basic mathematical knowledge, written records. They always go together – and the absence of any of them makes classification as a civilization doubtful. Indeed, each of these characteristics is a partial solution to the total problem that emerges when the conditions of precivilization are reached. These conditions are: too many people; lack of predictability and safety; a concern with status; too little to eat; struggles to understand the nature of ourselves, our world and our place in it; and attempts to store knowledge in some way other than in the limited and untrustworthy human mind.

The characteristics of civilization all appear together because they are part of the same thing: a cultural struggle to solve problems created by culture.

Yet, the list of the pressures of precivilization reads like – in fact, it is just another version of – a catalog of some of the gravest problems of our own time: overpopulation, decay of the environment, status systems reddled with devices that keep us from utilizing or appreciating human potential, starvation for many on the horizon, getting rid of the garbage, the tyranny of government and industry, the growth of knowledge beyond our means even to index, let alone assimilate, it. In every case, it is the same problem that we had before, given a characteristic twist by the fact that civilization was an answer to another and older version of the same problem.

Obviously, we stand on the threshold of postcivilization. When we reach solutions to today's problems, the society and culture that we will have built for the purpose will be of a sort the world has never seen before. It may be more, or less, civilized than what we have, but it will not be civilization as we know it.

Civilization itself, then, is a response to a culture crisis – a response taken a number of different times in the history and prehistory of human society. Civilizations either decay and fold up when solutions are inadequate or else – an almost unbearable irony – they have to alter themselves beyond recognition because of their very success. We are now in the middle either of a crumbling civilization or of one of those giant evolutionary steps that we cannot see because the goal is incomplete and clouded, in the very atmosphere around us.

So – What about these characteristics of civilization? It is easiest to discuss them if we begin with those that we think, perhaps wrongly, have the least effect on the more intimate aspects of our lives.

Writing: Writing is (except for a few *aides memoires* such as the knotted strings called *quipu* in Quechua, the language of the Inca civilization) the first device other than human minds and relationships for "storing" culture. Writing opened an entire new era because (to use the jargon of the computer age) the storage and retrieval problem was solved in a new way. Writing solves the storage problem better than the retrieval problem. Nevertheless, writing makes it possible to store vast amounts of culture over long periods of time without depending on the constant repetition that keeping it in mind demands. It can be written down and put away – and maybe somebody will unearth it someday. It is this fact – that all of the culture available to a society need not be kept constantly in mind – that leads to the accumulation of the vast amounts of culture, and allows for the cultural differences that the complexity of a civilization demands.

Literacy also affects personalities. In preliterate societies the only people who can become famous and immortal are those who act: heroes in the foreground of action. Literacy lays the groundwork for romanticism – the possibility exists that someday one will be discovered despite the scorn of one's fellows. Thought takes on a new meaning if it can somehow be disembodied momentarily from the thinker. A new dimension of an idea had been perceived, which may even have laid the groundwork of that most monstrous of philosophical separations – the separation of mind and body.

Writing also makes possible a new level of scientific achievement – again because there is no need for one person to know it all or for a complex social group to

organize the knowledge orally and to pass it on – a kind of organization found in early religion and in science, particlarly astronomy. Knowledge, in short, was released from the human mind and from the social structure in such a way that it could be called up by both, on demand. Thus, new dimensions in science, as well as in commerce and in literature, were discovered.

Calendars and Mathematics. It would seem that, often at least, scientific knowledge begins in calendars, which are among the outstanding intellectual achievements of all civilizations All People can count days, moons, and summers (or some other season of the year, such as wet seasons in the tropics). In some cultural traditions, people may be taught to count other things instead, particularly rituals or harvests, or even to repeat cycles without specifically counting any events. However, it takes a fair degree of sophistication to divide time into artificial periods such as hours or weeks, which have no natural countable events as their basis. And it takes still more sophisticated views and technology to keep records, even oral "records," in terms of the counted events or artificial units. Indeed, unless there is writing, this last step is usually not taken, even if all the other elements for accurate time reckoning are available. Calendars have been invented and reinvented in several parts of the world, but common to all is that when they are associated with writing, a new accuracy in record keeping can result and the basis laid for the maintenance of historical records. Thus the people who live in these societies can begin to appreciate the nature of history and historical change, rather than the mere cultural norms, sanctioned by remembered and misremembered tradition, of any "present" situation. Time depth is added in the civilization, a mixed blessing because it now becomes possible to control more precisely what information is "remembered" and what is "lost."

Creating a calendar demands some knowledge of heavenly bodies and, ultimately, astronomy. Science in all civilizations seems to have begun with astronomy and moved constantly in toward the self.

In the early days of calendars, as of writing, these arts tend to be carefully guarded secrets, in the hands of a priesthood or a ruling group. Writing and time reckoning give men power; therefore powerful men keep them away from those who have no power, reinforcing the social hierarchy and increasing the distance between the strata. In early civilizations, writing and record keeping are the prerogative of special classes – either privileged classes of priests or else of slaves who are in the immediate power of kings and priests.

Food Production. During the Stone age, men learned to make the kind of tools that allowed them to hunt large animals. Mankind thus acquired a new capacity for getting food that, in turn, led to a population explosion that, in its turn, meant that mankind was spread over larger parts of the earth's surface, in a wider variety of climates, and with ever more specialized tool kits.

The greatest change, however, came about 9,000 years ago when man turned from hunting large animals to sowing grain and planting roots and to the domestication of a few animals. This agricultural revolution, as it has been called, was not an unmixed blessing, for it introduced the possibility of famine into the world. Before that time famine had existed only in such marginal ecological systems as the northernmost tundra or in overpopulated areas. Even deserts and jungles, as they were exploited by hunting peoples, yielded a secure food supply. Agriculture, however, brought a new kind of dependence on weather, rather than on mere climate to which one can adapt. With harvest came the possibility of crop failure. Storage facilities had to be improved to secure against famine, indeed, even to make a crop last from one harvest to the next when there was no crop failure.

Agriculture was developed in several different parts of the world – in the Fertile Crescent, in the mountain regions of middle America, in the valleys of China, and probably independently in West Africa and the islands of Oceania and New Guinea. In spite of the new danger of famine, a new kind of plenty was created: the techniques of producing, rather than hunting and gathering, food allowed for a sedentary population. Until agriculture was developed, human groups were never sedentary – the only possible exceptions were those that lived on fish and seafood (but Binford claims that the earliest use of seafood dates from no more than 32,000 years ago).

So, agriculture brings sedentary settlement – and, of course, the problem of garbage disposal. Garbage is any product or any by-product of any animal that is not used up as food by some other animal. The more culture, the more garbage – until we turn culture into a device that always eats its own garbage.

However, sedentary settlement also creates the possibility of large populations in a small space thus supplying another of the requirements for a civilization: large populations in cities or urbanlike agglomerations, to go along with the required specialization of tasks and exchange of goods. Without food production by agriculture, large agglomerations of people cannot be fed.

Trade. Although there have been civilizations without long-distance trade, most have exhibited it. Once specialization has occurred and commercial exhange of specialized craft products and crops has been organized, the need for trade at a distance is felt, and the social niche for traders is ready-made. Trade is made vastly easier by the simplifying mechanism of general-purpose money, and money (but sometimes not coinage) is found in all civilizations marked by trade.

Luxury goods and raw materials acquired by long-distance trade increase the cultural distance between the various strata of society.

Government. When large numbers of people are present in any fairly confined space, new responses and legal, judicial, and military structures are required. Government tasks such as settling troubles and commanding armies become specialized jobs; administrators also begin to be specialists. In the early civilizations, most governments use the sacred authority associated with the religious hierarchy of priests as well as the profane authority of a secular hierarchy. Separating the religious hierarchy and the secular governmental hierarchy is a step that has been taken by only a few civilizations.

Protecting large agglomerations of underfended population from the "barbarians" of the desert or the nomads on the peripheries requires large armies. These armies are, in fact, a response to raiding as a form of parasitism on settled, farming peoples. But what results is a large army. If contracts are to be protected – and no large-scale society can persist unless they are – then the state must have a police organization to enforce the contract law in the absence of any other sanction. Record keeping by governments brings about other bureaucracies. Bureaucracy breeds bureaucracy, and bureaucracies tend to be self-serving rather than to serve those purposes for which they were designed. Governments are always on the verge of becoming unwieldy.

Stratification. We have already seen that, from the earliest times, literacy and education widened the cultural gaps between the strata of society. The presence of religious and governmental hierarchy, whether separated from one another or not, together with the specialization of crafts and industries and the development of trade, means that all the civilizations of which we have any record are stratified societies – some people or groups rank higher and have more privileges than others. Strata may be rigidly separated as in a caste system, or individual mobility among them may be permitted as in an open class system; but between these two extremes there are all shades of variety. These stratification systems are always associated with differences in rights, privileges, and material well-being. The problem of poverty or plenty has haunted may civilizations, and the most astonishing distinctions have been used to separate, classify, and "brand" the members of each stratum.

A civilization, then, is a very specialized type of society with a specialized kind of culture. Writing allows expansion of the available culture; science allows its organization. Agriculture and the production, rather than mere gathering, of food allows sedentary agglomerations, and both are prerequisite logically (although they may have grown together in historical time) to a complex division of labor, which means increased producting and trade. Innovations in legal and military branches of government with or without sanctions based on religion, are always present, so that a political mechanism resembling the state occurs. When all of these factors come together, the result can be called a civilization.

Today, with the wisdom of hindsight, we can see that civilizations formed with all their weaknesses. problems, and troubles vibrant.

THE CRISIS OF CIVILIZATION

When we achieve postcivilization, or "Phase II civilization," it too, of course, will come bumbling with all its problems intact, even though it may be a while before we recognize them. We know now only that the traits of Phase II civilization will stand as solutions to the problems of Phase I civilizations before they too turn into problems, and human beings again begin to flail about in search of Phase III civilization. Perhaps every age is a watershed. In some places it is possible to see only immense problems, while at other points solutions are emerging. Certainly what we see today is a recognition of solution in a few places, while in most we can recognize only the intense need for solutions.

Computers were developed to solve problems of the "information explosion" – problems of cultural storage and retrieval and of complicated manipulation of that culture at high rates of speed. Computers are extensions of the human mind, as much as eyeglasses or telescopes are extensions of the eye or as culture in general is an extension of the whole body. Computers do nothing but "follow orders," of course. But we do put all the

information (culture) into the computer in a form that makes it possible for the computer to carry out instructions. In other words, the culture in a computer is programmed for the limitations and needs of the computer. And the word *program* as a verb has fed back into the general culture: we now know that human beings are programmed to learn languages and indeed to learn culture, that every language demands a programming of information in terms of its categories and rules, and that languages vary about the kinds of things that must be programmed if one is to speak them at all. English, for example, demands programming of the sex of the third person singular; Japanese demands programming of the social status of the second person. Avoiding either leads to stilted expressions, but neither is demanded by the other language.

If computers are to work, culture must be processed to fit their capacities. This processing, like translation or like putting emotions into words, alters the nature of culture, for the simple reason that you must program some matters in a computer "language" (as in any other), while other matters cannot be programmed. We have, thus, altered the nature of culture. And if we are to use the computer for storage and retrieval of culture (which is what a computer does), we should learn to understand it well enough to prepare for its mark on the cultural traditions. Ultimately all kinds of culture will be reducible to mathematical or some analogous kind of "language" for storage in computers. Some of this stored culture will, obviously, be turned back into language before it is used, but some of it can be used by changing the nature or culture of the user. Again, the culture tradition will bear the mark of the storage and retrieval of culture, transformed into an idiom that fits the boundaries and capacities of a machine.

Computers may never create culture (but then again, they may, for they are said to write "music"). The point is a quibble when we realize that they do indeed store culture in a form other than human language and that, most importantly, computers are the first means ever found to make one piece of culture interact with another piece of culture outside the human mind. Nothing since writing has been so revolutionary as the computer. It stands to Phase II civilization as writing stands to civilization.

Although we are over the hill on computers – we can see that they are the culture storers, record keepers, and general culture police of the future – we are not sure when it comes to science. Science has by now become a self-perpetuating institution in our society. Just as writing and astrology were the prerogatives of the powerful in early civilizations, science, as it is organized and practices today, is an important arm of the Establishment. In science, the culture is not yet free of the social form, making scientists the priesthood of high civilizations. Not only do scientists have and organize more knowledge, they have established canons for truth and are even beginning to examine those contexts in which the canons of science do not apply.

What started out merely as an arrangement of the observations of early farmers, whose very food depended on integrating their subsistence activities with the seasons, has become so organized and socialized as itself to present a basic threat: it has a way of reducing all other modes of experiencing or organizing the human situation to "nonscience," which can be too easily equated with nonsense. To be against science because science, as a mode of knowing, has put us all in a straitjacket is difficult without appearing to be a know-nothing. People who question science's right to its unique position of power have an Anti-Vivi-Section League air about them. Yet we know that science may not be a very good basis for making social decisions. The task is, of course, to correlate science with ethics – a factor that has loomed ever larger since the Manhattan Project, when it first became evident to all that the question is inescapable.

Science cannot solve ethical problems. But scientists cannot free themselves from them. Social science cannot solve ethical problems either, although this is the role in which most "hard" scientists (in their own powerlessness) seek to cast it. And the reason that this is so, and will remain so, is that the canons of proof for solutions to ethical problems are once for all different from those that science inveighs.

Poverty. We have seen that at the time of the so-called agricultural revolution, security was reduced the very while the carrying capacity of the land and the society was increased. Thus, the pressure of overpopulation in a hunting territory was, by a cultural solution, turned into the pressures of insecurity of small farming communities. Then, through the years and centuries, distribution facilities were improved and new ways of food storage invented. Although, apparently because of prejudice and fear, we do not use the most effective method we have for storing food (a radiation process), food storage as a purely technical matter is not the point of greatest difficulty today. Technical problems remain, but the Western world is good at solving technical problems.

However, advances in food production and food storage do not extend to food distribution because food distribution is done through the medium of money, and in the program of money you still have to program social status. That is, in our scheme for food distribution, we program a number of factors other than the amount of food and the amount of hunger. It is akin to the need in the Japanese language to program in verb endings the status rank of the addressee. In today's world, these extraneous factors in monetary programming have to do with status and rank.

Whereas famine is the scourge of a peasantry, chronic malnutrition is the scourge of the civilized poor. Famine is caused by crop failures and lack of a long-distance distribution system. Chronic malnutrition may occur anywhere, caused by lack of protein or certain vitamins in the diet available to any people, but it is certainly rampant in situations where poor and hungry people must choose between spending scarce money for "good" food or for other things that they feel they need as badly. Poverty does not merely cause malnutrition – it positively encourages it.

Specialization of Tasks. Scholars of the early- and middle-nineteenth century saw that hyperspecialization within the system of factory industrialism led to a situation among the people (Marx called them workers) that we today call "alienation." They also saw that all of us are workers, becoming increasingly more specialized. Adam Smith's vivid description of specialization within the pin industry stands as the first horror story (although he did not mean it to be) of industrialization. Robert Owen, among many others, tried to create social systems that would take advantage of the new technology without paying the price of alienation. When the individual must perform a task too far removed from the other tasks necessary to make a final product, and when he is also out of touch with the user of his product, the stage is set for a process of alienation. When the number of people with whom each of us interacts becomes sufficiently large, we must also specialize our kinds of behavior in interaction. Obviously, all people (all animals) socialize for specific interactions, but in civilizations, there must be an active buffer (such as the Chinese family) or this specialization proceeds to the point where each of us performs only a few types of behavior with each individual we know. Our personalities segment with increased social complexity. Nobody knows "the real me" because the amount of me that I expose to any one person becomes a lesser proportion of all of me. Intimacy thus becomes the victim of large-scale industrialized societies.

Simmel, the great German sociologist of the early twentieth century, explained that progressive social differentiation must be overcome by constantly stronger and more effective, social organization. But there is another dimension that Simmel did not note: When alienation proceeds to a certain point, human beings develop insight. They learn to apply ethical judgments (good and bad – for one's self) not just to each other but to the very organization itself. And the organization is so large and so gross a mechanism that presently they can exist in crannies of an organization in which they scarcely participate. If, in a state of alienation, organization is associated with "The Organization" and rejected, then still a new dimension is apparent; like rogue elephants, we can opt out of "the society."

This specialization of tasks also vastly increases the number of choices each individual citizen must make. Each must now decide *what* he is going to specialize in: "What are you going to be?" And the protesters loudly protest with a basic truth, which annoys and frightens those who have already made a choice: "I am going to be a man." It is the cry for integration.

It seems that a new kind of ethnicity is developing to take care of these needs: all kinds of social groups, comparable to ethnic groups in their cultural discreteness and interpersonal trust and warmth, are emerging. The search is for a small, intimate community of people who "care," so that fractionalization and specialization will be held at bay within at least some social corners. The goal is comforting, shared culture.

Government, Bureaucracy, and Tyranny. Hunting and gathering bands usually answer the questions of law and military protection without formal organization; if there is formal organization, it is almost always based on kinship. But with the agricultural revolution, and doubtless in some places before it, the size of the population became such that kinship no longer worked as the basis for control, organization, and use of power. The state is an emergent sort of organization based on citizenship and contract (for all that the "social contract" of the eighteenth century was erroneously written as mythical history, much of what was said was correct if we understand it as an evolving organizational principle). If contracts are to be successful, there must be far more explicit sanctions than those provided by a kinship system. Indeed, successful contract law usually involves a police force, which assumes – which *is* – the state organization. The problem then becomes a matter

of perfecting the organs of the state. The system that always seems to have been adopted is the bureaucracy.

Bureaucracy makes governments (as well as large firms for production and distribution of goods) work. The rules in a bureaucracy become rules independent of specific situations or contexts. The bureaucracy thus becomes, at a social level of culture, divorced from any specific, thinking, creative mind. When that happens, two opposite but equally horrendous things occur: most people who are regulated by the system are cut off from any single source of power sufficient to alter the system, while a few can capture the bureaucracy and turn it to individual ends. Any bureaucracy that does not have a built-in system for making exceptions dies of its own machinations; but any bureaucracy that does not have a built-in device for dealing with tyrants is ultimately overthrown. Bureaucracy becomes "inhuman" because it is culture, in the form of rules, that is independent of situation or even of need.

Thus, as an integral part of the social form of the state, a new form of tyranny was introduced into the world. In well-run, orderly states – just as in the stateless societies that preceded them – people are not controlled by force, but rather by unwritten, invisible codes of ethics. The sanctions are there, but on most people they need never be brought to bear. With size and bureaucracy, however, and especially with poverty and that set of urban conditions that has become known as the "cultural sink," ethics disappear – and "naked power," as it is often called, takes its place. Violence is the simplest form of social interaction in any context because it takes the least amount of commonly understood culture to make it go.

Like everything else that is successful culture, the state grows, and with growth, its nature changes. The state becomes immense; the bureaucracy and danger of tyranny are also immense. Immense and expensive. Goodwill – good behavior – is the cheapest sanction; policemen are less efficient and much more expensive. When the alienated individual cannot "identify" with his state, the expensive police become more expensive. Tyranny increases. The state becomes separable from "the people" and begins to treat them as an audience. And every show has a Nielsen rating.

Status. Bureaucracies, by existing, affect the stratification of society, setting a new tone for stratification by privilege. The basis for ranking culture (and therefore people) changes. Privilege may be marked by scarce commodities or by some concept as difficult and pervasive as race. The moment that a bureaucracy, or any hierarchy, becomes a prison, rather than a device for creating stability and predictability, society is in trouble. And societies in trouble always seek ways out – and everything changes again.

Excluding people from culture that they want and can handle has never worked, and it shows no sign of working now. Yet it is a favorite human form for expressing and maintaining dominance patterns. All stability is tied up with dominance systems, but with human beings a dominance system inescapably carries a moral dimension. The morality of power. Today, instead of "Who dominates whom?" young people ask, "What right has the Military-Industrial Complex of the Establishment to run our lives?" To the question, "What do we do with waste products?" they add a little relevance-context to the specific problems of our specific age: "What right have profit-making producers to foul our waters and our air?" I have, here, done no more than ask the same questions in two sets of language.

Garbage and Urban Blight. Life is a complex chemical process for turning food into waste. Isak Dinesen, that magnificent Danish writer of English, whose real name was the Baroness Karen Blixen, put it delicately: the human body is a complex and "ingenious machine for turning, with infinite artfulness, the red wine of Shiraz into urine." What one might call the inverse Midas syndrome.

Ecologists and space scientists have taught us, in the last few years, to look at this problem in terms of the recycling of chemical elements and the influence of social systems and culture on that recycling. In space travel the environment goes with us and is so circumscribed that the cycle has to be a very short one so that compactness can be achieved. That is to say, the devices for turning carbon dioxide back into carbon and oxygen have to be extremely efficient and the squeamishness of space travelers must go by the board. In short, waste products must be immediately returned to food. The "balance of nature" is, of course, the same process stretched out in time and rendered invisible. In a balanced ecology, the recycling of all chemicals is in moving equilibrium. What is waste to one organism is food to another. The result is no large-scale change because of constant, small-scale changes.

However, for centuries in all civilizations, and particularly in Western civilization, there has been a disregard for the degree to which human beings are involved in recycling – a part of the same syndrome that until very recently made it so difficult to admit that

human beings are animals. "But not just an animal," they insist. Of course not, but neither is a muskrat "just" an animal. Every kind of animal is a special kind of animal. And once the admission comes, there is a typical overreaction on the part of the many – they leave out the characteristics the "not *just*" was meant to cover, and human beings are called naked apes.

Today we have to face the fact that all culture, in a very real and immediate sense, is the waste material created by human life. Human living makes culture. The question, therefore, has to be: What out there in the environment turns culture back into food? Culture obviously changes nature's recycling balance.

All human habitations have midden heaps surrounding them; archeologists would soon be out of business if this were not so. Mounds of clam and oyster shells surround early Scandinavian settlements; mounds of garbage surround New York City. We are still making midden heaps, assuming that nature will recycle our waste. But we see now that the question is becoming urgent. How do you recycle plastic? We are now using garbage as fill. As soon as we learn to "stabilize" it we can build mountain chains. After that, the next step will be to put landscape architects to work on it.

All this is only the most obvious manifestation of a greater truth: urban agglomeration. with sufficient size, becomes the cultural sink. The very concentration of people that is required to have a civilization has been so treated by civilization that civilization is not possible. Irony, like garbage, is all around us.

Population Control and Room to Live. Like precivilization on the eve of civilization, we have a vast overpopulation problem, and our resources are running out. In those days it was the large mammals that could no longer live in a situation dominated by so many human beings. In addition to instituting population control policies (most primitive societies, before contact, had workable population control policies), human beings also invented new culture by means of which new resources were utilized. And the population again exploded.

Toward Postcivilization

It is hard to see, just now, whether the present situation is a repetition of the pressures that gave us civilization or whether we are actually pressing the carrying capacity of the world. Certainly, we cannot count infinitely on cultural ingenuity to get us out of our difficulties. We must recognize that hereditarily human beings are programmed to multiply at a rapid rate and that, ironically, culture has now changed the "demand" for human beings. Cultural pressures must indeed be brought to bear to alter the very "instincts" of the animal. The last decade has seen a home truth – that voluntary family planning will not solve a population crisis, for all that it may lessen human suffering. We are also beginning to learn about the response of the body to spacing and to crowded conditions. Again, we must either alter the environment or "evolve" (with or without the help of drugs) means for altering our very metabolisms.

In talking about social change in the basic fabric of civilization, it is difficult not to become a Cassandra. Cassandra, poor dear, was merely an intelligent girl with a capacity for questioning the basics, for seeing beyond the immediate to the fundamental questions. Anything she said about those fundamental questions either had to be disbelieved or else overstated in such a way that only discomfort for her hearers could result. When one is trying to analyze the changes that have been made at a fundamental level but have not yet fully come to cultural expression, one is likely to be read as a presager of doom.

Yet, change is not doom – it is the very antithesis of doom. Doom is to be found in the struggle to resist change – salvation comes with understanding it. We must, to survive, see our emergence into Phase II civilization as a new opportunity to understand the mysteries of life, culture, and whatever emerges next.

AFFLUENCE AND THE WORLD TOMORROW

By Leroy S. Wehrle

The search for affluence is the pursuit of our time. Increasingly, however, we are uncertain where this search will lead, both for the industrial countries and for the developing countries. How may affluence, in concert with other factors, work to reshape the world over the next 30 years, and how will this changed world look from an international point of view? Many factors in addition to increasing wealth will be at work. We cannot be sure what these are and how they are working, much less what role affluence itself will play in the process.

Affluence is the state of society characterized by plenteous commodities and food stuffs, high use of energy and considerable leisure, all somewhat broadly distributed through the population. But in the world today, countries are confronted by the irony that greater national power and riches are not accompanied by equivalent power to shape their destinies. Increasing wealth is not matched by increasing capacity to achieve national goals, because industrialization and modernization create change faster than countries can choose goals or deal with the results of change. Moreover, the greater the affluence of nations, the greater their dependency on each other.

Affluence acts to destroy traditional cultures, or rather to transform them. Some cultures appear more adaptable than others to the needs of industrial society, for example, the Japanese and the German. Yet in all cases the modified cultures created by emerging affluence increase individual dependency on the economic system and the state and weaken dependencies of individuals on family, clan, temple and community. These new dependencies create new responsibilities for the state and lead to bureaucratic government.

Most Western countries and Japan have given themselves in submission to the pursuit of increasing wealth. Other national objectives such as creating a high culture or helping the poor have taken a back seat to the pursuit of affluence for the middle classes.

Socialist nations, on the other hand, have tended to view submission to the production of goods for everyone as vulgar and debilitating to the society. They want production, but prefer to keep a large part of it for meeting national objectives of accelerating economic growth, creating military power, exploring space, etc. Mao Tse-tung speaks forcefully about the evils of family plots and leftover capitalists who work or manage for private gain, warning that material incentives would be the end of discipline, hard work and subservience to the Party and the revolutionary spirit. Yet China too needs the means to produce wealth. How to gain wealth without changing the spirit and motivation of the people haunts China. France in her earlier days was darkly troubled by the fear that capitalism and consumerism would destroy the qualities of warmth and humaneness in her culture. She submitted fully to the Western race for goods only recently and reluctantly.

Few countries in modern times have had the audacity to reject the rest of the world and try things on their own. Burma has perhaps come closest to turning her back on the "materialistic" world around her. Ghandi cautioned India not to submit to the Western machine, but the advice was not taken.

In this country, affluence may be taking the zip out of the search for affluence. The dream of a few years ago that increased economic growth would solve many of America's problems now seems just that, a dream. A quarter-century of unprecedented economic growth has not solved the 350-year tragedy of black people in America. Growing wealth could create a black middle class and alter culture and values enough to create new norms of intermarriage and belief which would overcome this racial legacy. On the other hand, increasing income may only divide America more deeply and demonstrate that its most difficult problem is more intractable than ever. In a different vein, boredom and unemployment and a television view of a ubiquitous affluence may cause the ghetto Black to

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take heroin to escape his world. Affluence may be, directly and indirectly, causing the suburban White to take LSD to escape his world. In addition, affluence is bringing rapid population growth to countries which do not have cultural rules that tell people how to live in close compaction, as do Asian countries. And finally, minority and poor people in the United States, who previously were coerced into behavior desired by the rich, now find, as fear and coercion are removed by an increasingly aware and concerned public, that they are stranded in their new freedom, without new opportunities, rules and values to replace the coercive rules and roles which have been removed.

A minority of youth view today's world as a nightmare of injustice, powerlessness and dehumanization, totally unlike the humanistic, close-to-nature, and compassionate world they believe in. However, a majority of youth today either are not troubled by the world they see, or view science and technology as capable of building a better world where toil, starvation, sickness, prejudice and misery will be overcome. Erik Erikson notes that this contest of identities and meanings for youth is not unique to our time. Nevertheless, the ramifications of these contrasting life beliefs and choices will be considerable should the preponderant choice swing too far in either direction.

Apart from what the youth of today decide to do with their tomorrows, there is the question whether affluence is creating a panoply of problems of population, ecology, compacted living and complex interdependencies that in themselves will create problems more rapidly than Western man can find ways to cope with them. Increasingly, we see evidence that the culture of affluence in the United States could take the vitality out of the economic system, through an erosion of the ethic of work. while simultaneously overloading the economy with economic demands and benefits. Both the attitudes toward work and the increased benefits sought from government represent changed cultural values resulting from increased consciousness within society and prior economic success. There are indications in America of probings for new meaning in sensitivity groups, renewed interest in astrology and in Buddhist and Hindu forms of worship, though none of these seem to come close to grappling with the existential crisis of meaning that exists. If values diverge too markedly and intractably, the long-standing tension and creative balance of world views within the West which have endured since the Renaissance and the Reformation could come undone and create a period of severe unsettlement.

This interaction between economic growth and culture could go several ways. If powerful groups within a country were to believe that the ethical values and norms of a minority were becoming an obstruction to the continued performance of the economic system, they might seek to compel cultural rules of behavior which would protect the workings of the economy and society. An authoritarian response to the cultural attack on capitalism within the Western world is most likely because the complex and interdependent capitalist system can only function under conditions of broadly shared or imposed rules, procedures and goals Though authoritarianism might protect the economic system it would intensify the basic problem of the meaning of life in the modern world. This would bring the conflict between spirit and efficiency to a critical state and lead to major but unforeseeable change.

Thus in many ways affluence creates the means to oppose affluence. The argument is not that all of the adverse developments mentioned will transpire and will not be offset by opposing forces, but that some of these developments will come to pass and are themselves sufficient to disrupt the continuity of the political, cultural, economic and social life which has endured in the Western world for roughly the last 300 years.

II

The developing countries today are having a difficult time. Remarkable progress over the last 20 years in increasing economic growth has been offset by rising expectations of progress ang by rapid growth of population. Apart from whether economic growth declines in the industrial countries and causes a decrease in aid and trade, the developing countries today face major political, ecological and psychological problems.

First, there are indications that political forms in the developing countries may not evolve sufficiently or rapidly enough to facilitate economic growth past a certain level. Argentina, Costa Rica and Uruguay seem to have run into a political and economic deadlock. In the West, political change in most cases preceded the industrial revolution through the rise of the bourgeoisie. In Japan the political and social climactic of the Meiji dynasty was coincident with economic

growth. In the developing countries economic change has come before political change. Moreover, the abruptnrss of some of the economic changes creates difficult political problems. Consider the dramatic increase in rural income and the altered patterns of land holdings caused by the green revolution in northern India, which have led to strident demands by the hapless Harijans for betterment and a share in the new wealth. The pressures created in just a few years on the Indian social and political fabric are immense even though the threat of famine has temporarily diminished.

The evidence is abundant in Latin America that a rational and technical approach to growth has not brought hoped-for political and social health – witness Argentina, Bolivia, Brazil and Chile. Whatever the causes, excellent economic growth policies and in many cases results (from an economic point of view) have been followed by increased political and social unrest. In singapore and Malaysia, quite remarkable economic growth has failed to mitigate racial animosities between Chinese and Malays. Perhaps these are problems of turbulence in passing through a sound barrier of social and political change. More likely they represent difficult and enduring problems of expectations and performance.

Second, one form of precariousness has been exchanged for another. The previous Malthusian balance between food, traditional techniques and population has been replaced by a more complex balance between more food, advanced techniques and more population. Industrialization continues to tie the developing countries to a world market they cannot control while the new agricultural techniques tie these countries to new fertilizers and seeds that make the agricultural process more, not less, sensitive to the vicissitudes of nature as well as dependent on technology and inputs from the industrial countries. The new rice strains require precise amounts of water at each growth stage. New strains of seeds must be continually developed to maintain resistance against blight and disease. Food is now winning the race with population, but only through the adoption of advanced techniques which permit increased population growth but concurrently increase the risk of starvation should crops or technique fail or the world economic and environmental systems go off course for a while.

At this point, there is little solid knowledge of the ecological and plant disease risks man is running in squeezing more grain out of the soil of Asia. However, there are indications that nature exacts a price from man for yielding more production and discloses the price only at a later date. The later date has recently arrived for DDT and mercury. Thus far the price exacted for the new agricultural technology has been a race with pests and for water.

The third problem area is psychological. Unlike countries before them in history, the developing countries are forced not only to adapt to and emulate a powerful external cultural force – Westernization – but at the same time watch the powerful Western culture groping uncertainly with the consequences of its own success. If motivation is mostly a matter of believing in and end without being able to see its fulfillment, then the will to develop in the poorer countries may come into jeopardy. The developing countries through the magic of cinema, magazine and television are forced to live in two worlds and suffer the torture of seeing themselves both today and tomorrow, aware of the distance in time and effort that separates them from richness while some leaders in the societies become increasingly aware of the disadvantages of becoming rich. The essence of the situation for the developing countries may become this forced consciousness of arduous effort toward an ambiguous end.

Faced with such difficulty and ambiguity, will the *developing nations seek alternative goals to high* consumption and close ties to the world economy? Will these countries choose not to try to keep up or catch up with the developed nations? Would different national objectives provide these countries with an escape from the frustration of playing a game at which they cannot fully succeed? This is an important set of questions worthy of a much more deliberate consideration than is appropriated here. In my view, unless there are major upsets in the world economic order, the developing countries will be unable in the next decade to shift to new goals. Attitudes supporting economic development have become firmly established in the developing countries. Politicians must deal with these expectations transplanted from abroad or lose power. This is the cardinal point, and only a most unusual leader could buck these popular attitudes. Equally important, Western economics, techniques and cultures come packaged together. Decreased infant mortality brings population growth, while trade, media and tourists bring rock-and-roll music and mini-skirts. Countries must deal with population growth and expectations of economic progress and they have only a limited choice of how to go about this in an interdependent and media-drenched world. Countries

can follow a more autarkic development policy, but experience shows they will grow at a slower rate and hence have fewer resources. to deal with population growth and public expectations. The developing countries will be able to choose new goals only if the values and objectives of modernization are discredited or a prophetic leader arises and creates a new frame of meaning and a new interpretation of possibilities.

Let us take an allegory of the tree of life to depict a view of the overall situation. The people in the developing countries are seeking to climb the trunk and lower branches of the tree of life while watching their fellow men farther up in the middle heights of the tree, looking for all the world just like themselves, enjoying a most exotic collection of food, goods and leisure. Thus with the delights of climbing in full view above them, the developing countries redouble their efforts to climb. Yet the task grows more difficult, even as they develop technical climbing skills and prove they are tenacious climbers. It is their misfortune that the hasty climbers far above are dropping on their heads expectations and population and ecological problems that slow their climb. But there is another problem for these climbers. High up in the top branches of the tree curious things are going on – those fabled rich people seem to be pairing off and battling each other, some are acting quixotically and jumping off into the air, while others are trying to climb back down the tree. The climbers on the lower branches begin to question whether the top of the tree is the paradise they had believed.

Could not the arduousness of the climb plus the doubtful benefit of the affluent top of the tree lead to a failure of nerve of those leading the climb for the developing countries? If they look for a different tree to climb, will they not find that population, tastes and skills may be just enough adapted to a tree-climbing economy to foreclose a return down the tree trunk to a traditional balance between culture, technique, population and resources?

III

Anticipating the disruptive effects that our inability to deal with affluence may have in the industrialized nations of the West, we shall assume that the industrial countries will run into increasingly serious domestic problems and consequently try to withdraw from foreign policy involvement with other countries, especially in the developing world. We further assume that economic growth will continued, but at reduced rates. As the powerful countries withdraw from involvement in many parts of the globe, rearrangements of power relationships take place among the developing countries, accompanied by fighting and unsettlement. However, the industrial countries need order in the international system and they continue to promote regional arrangements based largely on the power and self-interest of the regional countries. To the extent that these regional arrangements adequately protect the trade and the overseas investments of the industrial countries they will endure, and the developing countries will continue to develop, especially if population growth declines. Two factors, however, could change this outcome.

If trade and financial flows become unpredictable and the overseas investments of the rich nations are jeopardized, the industrial countries will involve themselves again in trying to stabilize regional areas of the world and in securing trade routes. Even if such a reassertion of power by the major nations upsets the regional arrangements and leads to greater uncertainty and to increased warfare, the industrial countries will feel that they have little choice, since their economies are dependent on world trade even if it runs at a reduced tempo.

And if during the next one to two decades internal problems within theindustrial countries slow or stop economic growth, the developing countries would have a frightful time keeping ahead of their population growth. Indeed, they are having a tough time already. As noted earlier, even if the industrial countries maintain their economic growth but show signs of ill-temper and despondency, this itself could have a considerable effect on the developing countries. The vintage pioneer spirit which America displayed in providing development aid around the world between 1953 and 2967 represented and optimism and sense of confidence by the United States in the future and in itself; in some cases this gave the developing countries the same buoyant spirit. Various countries such as Taiwan, Pakistan, Turkey and Korea, and many of the Alliance for Progress countries in Central and South America, undertook economic development with zest during those years. In recent travels I have been struck by how this confident spirit has diminished. The competence in Latin America in terms of technical knowledge, economics and planning has grown immensely, but self-assurance in development and trade and political progress has declined.

The risks that leaders in developing countries decide to take obviously depend on their calculation of

their chances for success. Most assuredly, decreasing resources from industrial countries will affect the development plans and ambitions of the developing countries. I suspect that the presence of Americans with their enthusiasm and technical skills and confident manner (often misplaced) played as large a role in convincing developing countries to adopt ambitious development plans as did U.S. aid. I suspect that the energy and optimism expressed by the United States in placing aid missions around the globe was interpreted by some of the developing countries as follows: "These Americans really can do things. They are cocky and sure of themselves. We had better find out what they have to show us." Today the United States is taking steps to withdraw from such direct involvement in development by institutionalizing aid through international organizations, and essentially saying to the developing countries that we are no longer so sure about the product we were selling so energetically around the world just a few years ago. The United States will carry on a less active and interventionist foreign policy because it is unsure of itself for reasons that go far beyond Vietnam.

I believe we will see faltering leadership in the developing countries deriving both from the servere problems these countries must overcome and their lack of self-assurance that they can succeed, due partly to a shortage of political and economic models that show promise of success. If the United States is not the model to follow today, who is? What models are the developing countries supposed to follow in this age of used-up ideologies? Peru does not know which way to go. Which way will Chile really go? Which way can she go? For every politician in a developing country who urges planning and rationality to solve the country's problems, there is another politician of the people who say "No" to the rational approach, "No" to the industrial countries, and "No" to waiting. Many of these emotional, nationalistic leaders came to power after World War II on the crest of nationalism following the demise of colonialism. Then during the 1950s and 1960s these leaders were frequently replaced by rationalist and technical leaders such as Eduardo Frei, Ayub Khan, Lleras Restrepo, Lee Kuan Yew, Park Chung-hee, Suleyman Demirel and Diaz Ordaz. If the northern countries run into major internal problems, the developing countries themselves might well consider that their brief flirtation with Western values and trade was a disastrous failure; they would likely turn next to charismatic and mystical leaders who would find meaning within the culture and history of their traditional societies.

If industrial countries falter and behave unpredictably, widespread starvation and disorganization of the entire world economy would likely result. This would present the West with a supreme moral challenge. Would we let mass starvation occur? Would we have the technical means to prevent it? Would we be forced to close ranks and on an imperialistic basis put the world economy back together to protect our own standard of living? Or could we live apart from the developing countries, yet within sight of their misery?

IV

That Western society is facing a crisis of meaning in various dimensions is, I think, evident. How countries react to the crisis is the interesting question. Though one can rule out a peaceful, almost invisible cultural and social transformation a'la Charles Reich, one cannot so easily rule out failure of nerve on a scale that leads either toward collapse and antiquarianism or toward a prophetic reinterpretation of values and meaning while preserving the existing technology and economic system.

Alternatively, there is the possiblity that instead of radical political or cultural change as described above, a leadership might emerge and gain support for the conservative position of survival through a policy of equilibrium with our natural environment through zero economic and population growth. We would then no longer use the pejorative term "stagnation," but find a new word that captures the conception of man being in control and stopping growth. This would require an immense wrenching of the spirit. Yet our affluent use of energy and natural resources, of drugs and medicines, our production of things and use of land – all these could so change ourselves and our balance with our environment that there would be a cry for zero growth. It takes little science-fiction imagination to conceive of a virus, mutagenics or mercury poisoning scare that would start people questioning the risks of moving further toward affluence.

Post-industrial society confronts man with difficult problems of amanagement, knowledge, planning and environmental balance. Affluence, as a goal and as a dimension of post-industrial society, presents perhaps the most difficult problem because it changes man and his culture in terms of individual meaning, belonging and identity. Governments may be able to deal with pollution and planning, but changes in culture and meaning seem to be beyond them.

PERSPECTIVE

"Imagination, which, in truth,
Is but another name for absolute power
And clearest insight, amplitude of mind,
And Reason in her most exalted mood."

– William Worsworth

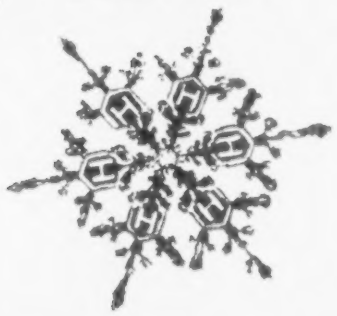
PARODY

Out of the "lives" of babes???

71

Jerome Bruner maintains –

Infants Are Smarter Than Anybody Thinks



By Maya Pines

In the late fifties, pioneering linguists like Noam Chomsky struck a powerful blow for a larger view of man's abilities. They declared that every human baby is born with a special competence that set him apart from all other creatures – including those "higher" animals that, in his helpless, neonatal condition, he might seem to resemble. The difference, they claimed, was that, instead of responding *mechanically* to whatever sounds he heard, his brain was so wired – or preadapted – that, on the basis of relatively few encounters with words and sentences, by the time he was 2 years old he could actually *reinvent* the rules of grammar and become able to speak. The theory credited babies–and mankind–with much more "mind" than most scientists were willing to accept at the time.

In the past few years, a number of psychologists here and abroad have gone one step further. One of their spokesmen has been Prof. Jerome Bruner of Harvard's Center for Cognitive Studies. By studying babies well before they learn to speak, these researchers have come to the conclusion that language competence is just one example of an even more significant ability with which infants enter the world – the basic ability to pick up logical rules from mere fragments of evidence, and then use these rules in a variety of combinations. There are programs of action in the human mind right after birth, they believe, not only for language but also for the intelligent use of hands, eyes and tools.

"It's a very different view of man," says Bruner, "and it's just beginning. People are starting to see that skills of this wide-ranging type couldn't possibly be learned element by element. There must be some kind of predisposition in man to allow babies to pick up so quickly rules that go for such a large number of situations."

If Bruner champions it, this new viewpoint is sure to grow. Bruner is a sparkling, persuasive man who brings excitement to everything he touches. He has a knack for choosing whatever subject will be "hottest" in psychology in the near future and then pushing it along.

Unlike many of his colleagues, who study the same topic for their entire working lives, he has ranged all over the field, going from rats and German propaganda (as a young man) to perception, Freud, congitive styles, sensory deprivation, learning, child development and innate behavior, always in search of how people register information through the filter of their own experience. ("You can never get a direct test on reality," he says. "You must take scraps and test them against your mental model of the world.") Along the way he has won much acclaim, but also some resentment from more plodding psychologists who accuse him of being a "flitter" and complain that he never stays with any subject long enough to make a major contribution.

Now 55 and world-renowned, Bruner is still seeking new problems. Not content with being a professor of psychology at Harvard and director of the center, he has just become the master of Currier House, a coed Harvard-Radcliffe house, and the first to have its own day-care center "so that the community can raise its own young." He is also studying the role of intentions, especially in babies, to see how the learners' own goals can be used as a prime mover for their self-education. For everyone, from infants to rebellious college students, he advocates more problem-finding, as well as problem-solving.

"He's very good at making people feel that everything is possible," says Prof. Roger Brown, a Harvard psycholinguist who worked closely with

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Bruner for many years. "Contact with him is liberating intellectually." Whenever Bruner takes up a new topic, he formulates his ideas in provocative ways, drawing from his wide knowledge of research in other fields to bring hitherto unrelated facts into his own framework. "His mind produces ideas at such a rate that even if you pick up only one-third you're bound to be stimulated," gushes an associate. He also knows everybody and has enormous stage presence, so that whatever he does attracts attention, and soon afterward other psychologists flock into Bruner's new preserve.

A decade ago, for instance he helped make it respectable – even fashionable – for psychologists to be concerned with education. For many years there had been a split between "serious" psychology and such practical matters, with better-known scholars looking down their noses at whatever might be considered the province of teachers' colleges. The only major exception was B. F. Skinner whose teaching machines and programed instruction had bridged that gap, but aroused much controversy. Bruner's involvement began when he served as chairman of a conference of scientists, scholars and educators at Woods Hole, Cape Cod, on better ways to teach science. His resulting report, "The Process of Education," was the clearest work on curriculum reform at the time, and won him instant fame. It has since been translated into 22 languages and is still being studied by teachers all over the world, particularly the ringing statement – which has been quoted over and over again – that "any subject can be taught effectively in some intellectually honest form to any child at any stage of development."

Although many of Bruner's ideas have changed since then, he stands by this famous statement, declaring that there is "absolutely no evidence against it." Another dominant theme persists: physics (or math, language, or any other subject) is not something that one "knows about," but something one "knows how to" do. It is a way of thinking, rather than a series of facts. Thus, when Bruner devised a social studies curriculum for the fifth grade, "Man: A course of Study," he gave 10-year-olds the raw materials with which to act like social scientists and three basic questions to start them off: What is human about human beings? How did they get that way? And how can they be made more so? The materials include films on the life cycle of the salmon, on free-ranging baboons, and on the Netsilik Eskimos, the purest surviving example of traditional Eskimo culture – the kind of authentic records previously available only to college or graduate students. "It's one of the greatest achievements in social studies," says a Washington school teacher who has been using the course for two years. "It rids them of preconceived ideas, loosens their tongues, and makes them think." the course has now been adopted by more than 1,500 schools. "Intellectual activity anywhere is the same whether at the frontier of knowledge or in a third-grade classroom," Bruner wrote in "The Process of Education." He still believes it passionately.

Ever since this book, he has been up to his ears in education. In his elegantly furnished office on the 11th floor of William James Hall, a tall concrete building with a fine view of Harvard, the phone jangles incessantly. It could be Rhody McCoy or John Gardner, the organizer of an international symposium or the head of a small parents' group. Some want his advice; others want to confer honors on him, or invite him to speak. Last year, for instance, he received an honorary degree from the University of Sheffield in England, and took part in a congress of leading intellectuals in London. He has also been a consultant to, or member of, countless advisory committees, task forces and Government agencies. He produces a steady stream of speeches, papers and books. There is probably not a major university in the Western world where he hasn't lectured. In fact, he is almost inescapable in education, either symbolically or in the flesh.

And yet education is only one of his interests. It is merely an outgrowth of his long fascination with the study of cognition – what and how people know. Perhaps this has something to do with the fact that he was born blind (his cataracts were removed when he was a year and a half old). But throughout his various incarnations, he has always come back to the same basic question: How do human beings gather, categorize, store, use and communicate knowledge?

CHARACTERISTICALLY, he brought the word "cognitive" back in style when he organized the Center for Cognitive Studies in 1960, together with the psychologist George Miller. For roughly 30 years, most positions of prestige in American psychology had gone to people who studied "stimuli" and "responses."

"The respectable thing then was behaviorism – and to some extent it still is," says Professor Miller, who is now at the Institute for Advanced Study in Princeton. "The general feeling was that Gestalt psychology had made its point and was about through, and any consideration of mental events was too

subjectivistic to be included in good science." There were also many Freudian psychologists, especially in child development and therapy, but "they were not the ones on whom the Establishment was betting."

However, new ideas were in the air. Spurred on by work on computer simulation and information theory, psychologists began to worry about the mind again – though sometimes they called it "the black box." Clearly, the black box had to sort out all the inputs and outputs; but how did it do it? The behaviorists did not even attempt to answer this question, which they considered irrelevant. Bruner and other researchers in the Harvard Cognition Project did. The result of their efforts was a book, "A Study of Thinking" (1956), which many psychologists consider still the best work Bruner has ever done.

"There were some strategy theories I had picked up from John von Neumann," recalls Bruner, pacing up and down his office, his hands waving to make a point. "Before that I'd been working on problems of perception. It was jokingly called 'the New Look' in perception – about perception as a filtering process. Perceptions are highly regulated entry ports: and experienced eye will pick up so much more! So I wanted to show how, in problem-solving people also use strategy for choosing the instances they want to think about. I was arguing that strategy and systematic search efforts are characteristic of all living systems – that there are structures and hypotheses in the mind, and that you're constantly testing them against fragmentary evidence from the environment. Your're locked – at the most tragic – you're locked into the structures that are species-specific to you, because that's the way the human nervous system is. But over and beyond that, there is a way in which, through the exercise of initiative on your part, you can turn around on your own information, reorder it, and generate hypotheses. The structures in men's minds are productive generative, just as grammar makes it possible for men to emit any number of utterances."

He stops and sits down, looking at me piercingly through round glasses whose thick lenses make his eyes seem extraordinarily large. "I guess I'm not a very typical American psychologist," he says. ' Or at least my colleagues don't think so. I think I'm right in the tradition that started with William James, of pragmatism, and that they're very much in the tradition [he laughs] of Ivan Pavlov! You know – 'we don't have to look inside to organism, there's no structure at all, all the order is outside, and all you do is mirror it.' Well, I take a drastically different view."

Elsewhere in Cambridge, this "drastically different view" was also coming to the fore. M.I.T.'s famous linguist, Noam Chomsky, had just revolutionized the study of language by discussing the structures in language – and consequently in men's minds – which, he claimed, made it possible for children as young as 2 to learn the rules of grammar without being taught. Children did not learn to speak but by bit as a result of stimulus-response mechanisms, he argued; instead, they figured out rules in the language they heard which allowed them to generate sentences that had never been uttered before. This, too, seemed part of the emerging cognitive approach. Some central place was needed to stimulate "interdisciplinary" research on cognition, and in 1960, with grants from the Carnegie Corporation of New York and other foundations, Bruner founded the Center for Cognition Studies together with Miller, who was known for his work on the psychology of language.

The list of research fellows and visitors to the Center in the last 10 years reads like a global Who's Who of psychology and linguistics, with a sprinkling of physiologists, anthropologists and other scientists. Among others, Dr. Barbel Inhelder came from Geneva, Switzerland; Dr. Zoltan Dienes from the University of Adelaide, Australia; Chomsky crossed over from M.I.T.; Dr. David McNeill came from the University of Michigan. At this year's first meeting of the 20-odd members of the staff, Bruner introduced visitors from the Hebrew University in Jerusalem, the University of Moscow, and a research institute in Prague.

Being invited to the Center was – and is – a sign of *savoir-faire* as well as real intellectual distinction. For graduate students the admission process is particularly delicate. "It's not *officially* difficult to get into the center." explains a student. "There are no formal application procedures – so it's even more difficult. You have to get to know Bruner – go to his seminars and talk to him – and then it just happens." Bruner's seminars are open to any graduate student, but they are always oversubscribed. He's also a very busy man. However, students who do attract his attention reap early rewards. "Both Patty Greenfield and I had the experience of being taken seriously by him when we were still undergraduates," says Susan Carey Block, a young lecturer in psychology, with real gratitude. "He has absolutely no intellectual prejudice against women." She has collaborated with Bruner on various research projects (as did Dr. Greenfield) and still works closely with him. Like most of the women

associated with the Center, she combines brains with style and uncommon good looks.

The first thing that emerged from this research was a new respect for the intelligence of infants. It turns out that not only do infants notice many more details of their environment than adults ever suspected, but they actively invent rules or theories to explain what they perceive. Even at three weeks of age, an infant will have fairly complex hypotheses about the world he has just been born into – and if he is proved wrong, he may burst into tears.

That was exactly what happened at the Center two years ago, during an experiment conducted by a Radcliffe undergraduate, Shelley Rosenbloom. Researchers there wondered whether babies of three or eight weeks really understood that a person's voice should come from the spot where the person stood – whether babies have the idea of a locus. To find out, they decided to use stereo speakers that could separate the sound of a voice from its origin. In response to ads in The Harvard Crimson, there is always a procession of babies – mostly the offspring of graduate students – to the center's lab, where they are made comfortable, given toys, and usually offered something interesting to see or do as part of a psychological experiment, while their mothers look on. This time, the infants were seated in front of a glass partition that separated them from their mothers, whom they could see just two feet away. As long as the speakers were balanced so that the mother's voice seemed to come directly from her, an infant would be quite content. But as soon as the phase relationship between the speakers was changed so that the voice seemed to come from a different spot, the baby would become agitated, look around, or cry – showing that his expectations were thwarted, and that there is powerful information-processing ability in the brains of infants even at that early age.

Bruner himself was particularly interested in how infants learn to use their hands intelligently. How do they discover the value of two-handedness – how do they develop a "power grip" with one hand, to hold objects, and a precision or operating grip" with the other, to actually do the work or handle the tools that are so typically human? This is something that nobody ever teaches infants, just as nobody teaches them to talk. Yet by the age of 2, the normal child has learned to speak, built himself a large framework of theories about the world, and taught himself various intricate skills which he can use in new combinations whenever the need arises – an extraordinary achievement.

"You know there's Winston Churchill's famous remark that people are always stumbling on the truth but ignoring it," says Bruner, the words spilling out of him. "So much of my early work on perception had indicated the selective filter – perception of what one expected to see. Well, as I got more and more into this work on skilled behavior – the child learning to take two objects at a time, learning to reach around a detour, learning to do one thing with one hand so he can do a complementary thing with the other hand - it became increasingly evident to what extent intent and hypothesis are central to theorganization of knowledge and to the filtering of input."

The infant's own intentions are crucually important, Bruner now believes. On their fate hangs what the baby will learn or tune out. Good toys "tempt out" more self-initiated activity, and responsive parents quickly establish a code of mutual expectancy between themselves and their babies which serves as a precursor to language. When parents fail to encourage play and dialogue, however, and react to their babies mostly by punishing them for errors – as often happens in lower-class families – the result is to breed a sense of powerlessness which effectively stops learning.

Of course, some goals can be imposed from outside, and babies can be taught, for instance, to respond to a buzzer in certain ways. Thus, Dr. Hanus Papousek, a Czech psychologist who is now spending a year at the center, has conditioned newborns to turn their heads sharply to the side at the sound of a buzzer, in order to get milk for a bottle.

"It can be done," agrees Bruner, "but it's endless. The babies show so much aversion to this. They're so slow at learning it, you have to present the stimulus hundreds of times."

By contrast, when the infant uses his own initiative, learning often comes with lightning speed. To show what he meant, Bruner took me into the lab, a medium-sized room which might be called a boby theater. There, facing a blank wall which served as a screen, an infant was placed in a well-padded seat, with a pacifier in his mouth, and shown a movie. "We didn't want to condition them to respond to a stimulus," Bruner explains. "Instead, we wanted to choose something the child does and give it some *consequence.* Then he is at the controls. So we chose sucking. Would they learn to suck at different speeds in order to produce changes in their environment? And, lo and behold, these little four-, five- and six – week-old infants do learn to suck in longer bursts to

produce a clear focus. Or else, if you reverse the conditions so that sucking blurs the picture, they learn to *desist* from sucking on this pacifier. They respond immediately, during the very first session, to changes produced by their own acts."

The movie that the babies watched so eagerly showed an Eskimo mother playing with her child. "It was shot in winter, indoors, and she was constantly involved in little games with him – string games and so on,," explains Bruner, adding that this was a sequence left over from his fifth-grade social-studies curriculum. "I just swept some things up from the cutting-room floor," he laughs.

During its first years of operation, the Center for Cognitive Studies paid no attention to babies. It focused on psycholinguistics and on its growing rivalry with Switzerland's eminent Prof. Jean Piaget, the "giant of the nursery." Piaget's monumental studies of child development had been ignored in the U.S. for several decades, until the cognitive movement awakened to their value. In bold strokes, as well as painstaking detail, Piaget had described the growth of human intelligence, from the first day of life until adulthood. He had shown how children construct their own mental models of the world in successive stages, following an invariant sequence, though they may go through the stages at different rates. When a child has experienced enough conflict between reality and his image of it. he changes this image to make it more accurate. Thus, at first a child cannot understand that when water is poured out of a full glass into a wider glass which it fills only half way, the amount of water is unchanged. Being centered" on only one aspect of reality at a time, he sees that the glass is half empty and says there is "less" water than before. Through a series of experiments, Piaget explored how children develop what he calls "conservation," the understanding that a quantity of water or clay will remain the same, regardless of the shape it takes. As children realize that objects and people have properties that do not depend on their immediate appearance, they become able to deal with symbols. Intelligence consists of such leaps into abstraction – but it depends on a large repertoire of images with which one can visualize certain sequences of cause and effect.

Bruner was among the first to appreciate the importance of Piaget's work. In "The Process of Education" he devotes considerable space to the contributions of "the Geneva school." Many of his own papers show a strong Piagetian influence, particularly those in which he discusses the stages in cognitive growth. But eventually he developed differences of opinion with Piaget about how children acquire the notion of conservation and – much more fundamentally – about what produces intellectual growth.

"Mostly we argue about prefixedness," reminisces Bruner. "I first met Piaget – let's see, how long ago? – 15 or 16 years ago, when he came to Boston to give a lecture. I was invited to dinner, and we struck it off just beautifully. He's such fun – full of lively ideas. It's one of the most delightful continuing relations I have. So then I visited over there a few times. He's very much of a walker. I'm more of a sailor, but I like walking, too. He and his collaborator, Barbel Inhelder, and I would go up for long walks in the mountains near Geneva. And I found increasingly with Piaget that his notions of interior order were much more prefigured, prefixed than mine. I think this was the thing that caused something of an intellectual right between us. I think that he misunderstands me more than I misunderstand him. He is too concerned with how the mind just processes things.

"I told him once, only half-jokingly, that his study of mollusks [conducted when he was only 15] was characteristic of him. His idea was that here was a mollusk, and no matter what that mollusk ate or what that mollusk did, it always turned out to have the same prefigured shell. Piaget's notion of intellectual development is a bit too much like his early conception of the way in which a mollusk grows. As one of his colleagues pointed out when he was here a few week's ago: What does Piaget need a theory of education for? Either the child hasn't reached the right stage, and there's no point in trying to teach him anthing; or he has already reached that stage, and why bother to teach, as he'll learn anyway."

In Bruner's view, evolution has given man a wide range of possiblities – far wider than Piaget would allow – because man is a culture user, and his growth depends largely on the kinds of tools he uses. "I don't believe you can or should separate anthropology from psychology," he declares. Increasingly, in recent years, Bruner has focused on one of the fundamental distinctions between man and apes: the development of manual skills which, he believes, involves strategies which can later be used for thought and language, as well as for man's unigue manipulation of tools.

This search for the origins of man's skills led the Center to study even younger children. By 1967, when George Miller left, the transformation was complete: Nearly all of the Center's research dealt with the

cognitive development of babies, including infants only a few weeks or a few months old.

The experiment was devised by a graduate student, Mrs. Ilze Kalnins. When the babies discovered that sucking made the pictures clearer, they cut down their pauses between sucks, stopping only four seconds. On other visits to the lab, when they found that sucking blurred the image, they lengthened the pauses to about eight seconds.

Curiously, this experiment comes quite close to the kind of operant conditioning pioneered by Skinner, in which rewards are used to "shape" a child's activity. But Bruner interprets it quite differently, seeing the babies' rapid learning as the effect of fulfilling their own intentions. Sucking to produce a sharp focus involves quite complex strategies to coordinate looking and sucking. Such strategies comes "from the inside out," from an innate preadaptation, Burner believes, and only after their appearance has been evoked by events can trial and error and reinforcements by of any use.

"How do babies grow up intelligent?" he asks. His answer: by working out such strategies, which can later be used in various ways – for instance, the strategy of "placeholding." The earliest evidence of this can be seen in infants' sucking behavior. As everybody knows, a pacifier will calm a baby. But why? Earlier research had shown that sucking reduces hunger pangs and relieves muscle tension. "Well, by putting electrodes on the temples of babies as they were watching a movie here, we've begun to find out what a pacifier really does," says Bruner. "One of its principal effects is to cut down scanning eye movements, which cuts down the baby's information intake." At birth and for a few days thereafter, babies can't cope with more than one activity at a time. When they wish to suck, they close their eyes tightly, to avoid taking in information from the outside. When their eyes are open, they stop sucking. By the age of three to five weeks, however, they can suck with their eyes open – but as soon as they become really interested in something, the sucking stops. (This makes their performance while watching the Eskimo film all the more remarkalbe: to bring the picture into focus, they had to suck in longer bursts without looking at the film, then take a quick look before it blurred again.) Finally, between the ages of two and four months a new strategy appears. Whenever something catches their attention while they are sucking, they stop their usual-suctioning and shift to a sort of mouthing which keeps the nipple active, though at a reduced rate. This allows them to pick up where they left off with great ease, once their curiosity has been satisfied. A neat solution to an early problem, "place-holding" of this sort leads to many later skills, both manual and linguistic.

"I've got so much kidding from my own children about this $18,000 nipple," smiles Bruner, unwinding three long, thin tubes joined together in an ordinary nipple – the parcifier used in these studies. "You see how it's made – this is so funny, but so much of life consists of these funny plumbings. Through one of these Teflon tubes you can measure negative G in the mouth, so-called 'kissing pressure'[he demonstrates, pursing his lips]. Through the other one you can feed the baby milk, and then this blue one gives you essentially biting pressure [he brings his lips tightly together]."

It's a treat to see Bruner imitating a baby. He is a natural actor – which accounts for much of his impact on people. Recently, he and a colleague made a movie entitled "The Intention to Take – The Infancy of Object Capture." It documents how babies begin with an intention, act out its intended results (or an approximation thereof), and then work backward to the components that will in fact make such results possible. "First, they look at the object," says Bruner, describing the movie. "They want to take it. It's an intense gazing. Then, as the child's intention gets organized, his lips come forward in what we call an A-frame mouth [he mugs it]. Later on, when he takes hold of the object, it will go into his mouth; but already, his whole system is activated, his mouth works. Then his arms come up in an antigravitational movement [he thrashes about like a baby]. We have one shot of a baby that has closed his hand, like this [he demonstrates], in irreversible tension, and although he wants that object, he can't get it unclenched." A little later, I saw the movie, which features real babies and Bruner's voice as narrator – unusually slow-paced for him, but still resonant and dramatic. Though it was well made, it wasn't half as vivid as Bruner's own acting out of it.

"He doesn't *need* a film!" exclaims a Radcliffe student who have taken his famous introductory course, Psych 148. "His lectures are so lively. He's known for his neologisms (we used to count the words he made up) and his large vocabulary (which he loves to dazzle undergraduates with), but expecially for his initiations. He imitates babies and baboons, and slow lorises – they're a kind of lemur, very primitive, his favorites, actually. He does wonderful imitations of them, using his hands."

Bruner's present concern with the importance of intentions and self-activations extends well beyond the world of babies. He finds in it, too, answers to some of the troubles that have been plaguing American campuses.

Last year, during the Harvard revolt against R.O.T.C., "I found myself right in the middle of it," he says. "It was an eye-opener for me, to see the extent to which these kids can rise to their responsibilities. They are the cream of the crop. They have energy and brains, and a terrific drive to take control of their environment. Educational institutions should give them some sense of how to do it."

He proposes a dual curriculum to take advantage of this drive: on Mondays, Wednesdays and Fridays, students would continue with the essential basic courses, such as mathematics or language, in which one step must be taken before another; and on Tuesdays and Thursdays, they would be let loose to govern their own learning in ways as experimental as possible. This would include taking part in budget decisions, teacher evaluation and related matters – but more than that, it would mean that they could find their own problems to study. Preferably, these should be problems for which no answers yet exist.

Students are usually exposed to only two types of problems, Bruner points out: those which require analytical thought – e.g., dealing with abstract formulas – and those which require them to do some kind of laboratory exercise. "Both are formulated by the instructor or the text or the manual, and both are important in any science, art or practical sphere," he says. "But neither is much like problem finding. This requires the location of incompleteness, anomaly, trouble, inequity, contradiction. . ."

Having located plenty of these in the university, Bruner recently agreed to become the master of Currier House, the new Harvard-Radcliffe residence. He would like it to serve as an example of how a community can encourage and make use of its member's initiative – regardless of their age – taking care of its own babies and dealing with real problems, such as drugs, head-on.

In the past six months, he has devoted nearly all of his formidable energy to it. He hand-picked the 16 resident tutors – several married couples, some with babies, several blacks, one former nun – all of whom are guaranteed to be intellectually very much alive. He helped raise money from private sources to start the day-care center. He helped pick the modern furniture and organize the space in comfortable, as well as stylish, ways. He plans to invite active people from many spheres of life and many countries to be guests at the house and dine with the students. He hopes that courses of the Tuesday-Thursday variety will soon get organized – and already the elevators boast notices about informal workshops on medicine and society, communication and community schools, and an experimental theater, urging students to "feel free to suggest and organize other seminars and workshops."

As master of Currier, Bruner shares a duplex apartment on the premises with his second wife, a poised and attractive woman whom he married 10 years ago after a whirlwind courtship. The niece of psychologist Adelbert Ames, she had originally come to Bruner to look for a job as a research assistant. Recently, she worked with him on one of his papers and even went to Alpbach, Austria, to read it, but now she is thoroughly involved in Currier House, where she holds the awkward title of "co-head." Together, the Bruners have seven children – five of hers, two of his – all of whom are grown and live away from home but who sometimes join them on their 48-foot yawl during summers, when they cruise off the coast of Maine. Mostly, he reads and writes on board, but occasionally he takes part in races. "I'm a first-class navigator," he says immodestly. "We've been in the Bermuda races three times."

Sailing has meant a lot to him since his childhood in Lawrence, L.I., where he was "something of a water rat," he recalls, "sailing, wading, fishing. . . . I also read a lot. School was no challenge – it was too easy – and I was always looking for something else. I had a desperate need to read anthing I could get hold of." His father, a German-Jewish watch manufacturer, died when Bruner was only 12. After high school, he went to Duke University, received a Ph.D. in psychology from Harvard in 1941, served in the Office of War Information – he still speaks nostalgically of his wartime experiences in France – and then returned to Harvard, where he has remained, with brief interruptions, ever since.

Among American psychologists – at least, the heads of graduate psychology departments, according to a survey published in the proceedings of the American Psychological Association's convention last year – Skinner still ranks No. 1, and Bruner comes only 11th in lists of leading contemporary psychologists. Although the cognitive star is rising, behaviorism is far from dead, especially in the South and Middle West.

There is also some feeling among psychologists that Bruner's brilliance in manipulating ideas and getting people started on research does not carry over to the detailed "donkey work" of experiments that may be necessary to obtain convincing results. "He does not generate high-quality evidence," says a psychologist who prefers not to be named. "Piaget's ideas are based on enormous amounts of data. But with Bruner, there is no substantial amount of evidence yet on infancy."

However, others feel that giving new directions to scientific thought is just as important as producing new data. Even those who disagree with Bruner's methods or with the cognitive approach give him credit for enormous vitality and influence. He seems indefatigable, always involved in a variety of new projects which he handles with gusto.

"He's a marvelously enthusiastic and stimulating guy," says George Miller. "He goes into new areas every five or six years, does something very brilliant, revitalizes them – and moves onto something else. It's not something that accumulates, as when people go in a straight line. But he has a style of doing things. He brings his own insight; he revises, restructures the field; he gives his own interpretation, puts a Brunerian stamp on it – and then leaves the hard work to other people, after having pointed out what the real problems are, instead of what they've been working on."

Today, it's infancy and innate programs of action, with Currier House, a new course for adolescents, the Tuesday-Thursday curriculum, and two books that he's writing on the side. And tomorrow – who knows? As Piaget once remarked: "Bruner is a mobile and active man. He is unpredictable – and this is what makes his charm."

PERSPECTIVE

"Education" is simply the absorption of "feeling"... not with one sense... but all five... plus the most important one... the sixth... the one that confuses us... but controls us.

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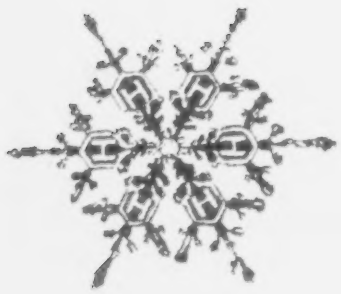

Fresh Air in Education

WHAT DO I DO MONDAY?

By John Holt

Reviewed by Ronald Gross

The reviewer is a vice president of the Academy for Educational Development. His books include The Teacher and the Taught: Education in Theory and Practice from Plato to Conant *and* Radical School Reform.

Over the past six years, a small, tough band of writer-teachers has sparked a radical reform of American schools. The milestones in this movement have been the widely read books of Jonathan Kozol, Paul Goodman, George Dennison, Edgar Friedenberg, Herbert Kohl, and, of course, John Holt himself *(How Children Fail, How Children Learn, The Underachieving School).* Even more important than their best-sellers, these people – and thousands of others who don't write books – have worked passionately to create models of education that is at least decent and just, and at best joyous, humane, and liberating.

Most recently, the entire movement has achieved status and wide publicity through Charles Silberman's *Crisis in the Classroom,* a massively documented, Carnegie-supported account of how grim and unstimulating schools are, but, of how the trend toward "informal" education offers hope.

Enter Holt. Or, more accurately – since this is where he came in six years ago – re-enter Holt with a benign vengeance. *What Do I Do Monday?* is the question that teachers, parents, and students are increasingly asking. Enough of theory and scattered experiments. How to move away here and now from the conventional classroom, toward freer, more productive learning in schools? Holt accepts teachers, schools, and students as they are – with fixed curricula, regularly scheduled classes, and the like – and makes literally a thousand suggestions for opening windows to blow air from the outside world into the classroom making it new and making it human.

A good part of the book is devoted to these specific ideas for working with numbers, speech, and writing, for learning how the world is and has been. I list them this way, rather than as mathematics, language arts, etc., to reflect Holt's basic point that school subjects are all parts of life and living, and that, thus construed, kids will understand them far better than if educators abstract them from their human context, get them down in print, divide the amount of print by the number of class sessions, and chop them up into chapters, lessons, and tests.

The delight and force of the book comes from its concreteness. Holt doesn't waffle about "the discovery method" of teaching mensuration, for example. In Chapter 15, he explains how to order a cheap, sturdy, accurate stopwatch from Wolverine Sports Supply in Ann Arbor, and how to let kids use it to find out how fast their hearts beat, or whether they can guess how long a minute is more accuratly after trying it a few times, or any better things for which they think of using it. Holt's pedagogical creativity is boundless. "More things to do with a stopwatch" begins Chapter 16. In many ways, the book is as good for parents as for teachers; what school fails to do can be done at home easily and with great fun.

All of these suggestions Holt puts forward in a firm theoretical context: "I believe that we learn best when we, not others, are deciding what we are going to try to learn, and when, and how, and for what reasons or purposes; when we, not others, are in the end choosing the people, materials, and experiences from which and with which we will be learning; when we, not others, are judging how easily or quickly or well we are learning, and when we have learned enough; and above all when we feel the wholeness and openness of the world around us, and our own freedom and power and competence in it."

Holt's book is an engaging mental ramble through some of the best practical works in the literature of radical school reform. He converses in print with

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George Dennison, Frances Hawkins, Ken Macrorie, and James Moffet. The concluding chapter on how to begin Monday in any community, any school, any family, is a goad to action. For the teacher, parent, or student who is hungry for hope, these pages are the start of the seventies for schooling in America.

But will these ideas and approaches – and others like them that are growing out of the new "free schools," the experimental programs within the public education system, and the minds of other innovators like Kohl and Dennison – will these techniques be adopted widely enough to change the tone of American schools? Perhaps. If Silberman's *Crisis* is correct in its diagnosis, schools and teachers are ready for this kind of change. Already whole cities and states – most recently New York under State Commissioner Ewald Nyquist – are plumping for the new approach.

Yet one must temper hope with an awareness that education is largely and subtly shaped by economic, social, and political forces. It would be odd if the present climate in this country encouraged radical reform of the schools. It would amount, one might say, to a greening of American education.

What Do I Do Monday

THE WORLDS I LIVE IN

By John Holt
(Three Selected Chapters)

We can say, then, that we live in a number of worlds. One is the world within our own skin. I live within my skin, inside my skin is me and nothing but me, I an everywhere inside my skin, everything inside my skin is me.

At the same time I (inside my skin) live in a world that is outside my skin and therefore not me. So does everybody else. If we look at things this way, we can say that we all live in two worlds.

But this now seems to be incomplete. As we have seen, there is an important sense in which each of us lives in a world that is outside our skin but that is *our own,* unique to us. We express this view of things in many ways in our common talk. We speak of someone "sharing his world," or of "living in a world of his own."

The idea of the mental model may make this more clear. Suppose I am sitting with a friend in a room. At one side of the room is a door, closed, leading to another room. I have been in this other room many times, have spent much time in it; my friend has never seen it. That room exists for me and for him, but in very different ways. In my mind's eye I can see it, the furniture and objects in it. I can remember other times I have been in it and the things I did there. I can "be" there in the past, or right now, and in the future. My friend can do none of these things. The room is not a part of his mental model, but beyond the edge of it, like the parts of old maps marked Terra Incognita – Unknown Lands. He can, of course, speculate about what *might* be in that room, what it *might* be like. But he does not know.

Let us think of ourselves, then, as living, not in two, but in three or even four different worlds. World One is the world inside my skin. World Two is what I might call "My World," the world I have been in and know, the world of my mental model. This world is made up of places, people, experiences, events, what I believe, what I expect. While I live, this world is a part of me, always with me. When I die, it will disappear, cease to exist. There will never be another one quite like it. I can try to talk or write about it, or express it or part of it in art or music or in other ways. But other people can get from me only what I can *express* about my world. I cannot share that world directly with anyone.

This idea, that each of us creates and has within him a world that is and will always be unique, may be part of what men once tried to express when they talked about the human soul. And (among other things) it is what makes our government's talk about "body counts" in Vietnam so obscene.

World Three is something different. It is, for my friend, the world on the other side of the door. It is the world I know *of,* or know something *about,* but do not know, have not seen or experienced. It has in it all the places I have heard about, but not been to; all the people I have heard about, but not known; all the things I know men have done, and that I might do, but have not done. It is the world of the possible.

World Four is made up of all those things or possibilities that I have not heard of or even imagined. It is hard to talk about, since to talk about something is to put it, to some extent, in world Three. An example may help. For me, Argentina, or flying an airplane, or playing the piano, are all in World Three. For a new baby, there are all in World Four. Almost everything in my World Two or Three is in his World Four. Not only is my known world bigger than his, but so is my world of possibilities. The world he knows is very small; the world he knows *about* is not much bigger.

Within each world I know some parts much better than others, some experiences are much closer to me

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than others, more vivid, more meaningful. In World Three, for example, the world I know something about, there are things about which I know a great deal, so much that they are almost part of my real experience, and others about which I know much less. Indeed, the boundary between Worlds Two and Three is not at all sharp or clear. One of the things that makes us human is that in learning about the world we are not limited wholly to our private and personal experiences. Through our words, and in other ways, we can come very close to sharing our private worlds. We can tell others a great deal about what it is like to be us, and know from others much of what it is like to be them. If not for this, we would all live, as too many do now, shut off and isolated from everyone else.

In the same way, the boundary between Worlds Three and Four is not clear either. There are possibilities that are so far from possible that it is hard to think about them at all. I know enough about Sweden to have at least some feeling about what it would be like to go there or live there. About Afghanistan or China I know much less. I can speculate a little about what it might be like to be on the surface of the planet Mercury. Beyond that there is the galaxy, and other galaxies, and possible other universes that I have no way to think about. I can have some feeling about what it might be like to do or be certain things. It is much harder for me to imagine what it might be like to have a baby, or be on the brink of death. As for being, say, an amoeba, or a star, I cannot consider the possibility at all. As some things in my real or known world are more real or more deeply known than others, so some things in my possible world are more possible than others.

LEARNING AS GROWTH

By now it may be somewhat easier to see and feel what I mean in saying that we can best understand learning as growth, an expanding of ourselves into the world around us. We can also see that there is no difference between living and learning, that living *is* learning, that it is impossible, and misleading, and harmful to think of them as being separate. We say to children, "You come to school to learn." We say to each other, "Our job in school is to teach children how to learn." But the children have been learning, all the time, for all of their lives before they meet us. What is more, they are very likely to be much better at learning than most of us who plan to teach them how to do it.

Every time I do something new, go somewhere new, meet someone new, have any kind of new experience, I am expanding the world I know, my World Two, taking more of the world out there into my own world. My World Two is growing out into my World Three. Very probably my World Three is also growing. As I go more places and do more things, I see and hear about still more places I might go, I meet more and more people doing things I might do.

One of the things that we do for children, just by being among them as ourselves, by our natural talk about our own lives, work, interests, is to widen their World Three, their sense of what is possible and available. But we only do this when we are truly ourselves. If children feel that we are pretending, or playing a role or putting on some kind of mask or acting as some kind of official spokesman for something or other, they learn nothing from us except, perhaps, and sadly enough, that since we cannot be believed and trusted there *is* nothing to be learned from us.

If we understand learning as growth, we must then think about conditions that make growth possible and the ways in which we can help create those conditions. That is the purpose of this book. Let me say here, in a very few words, some of the ideas I will be discussing at greater length in the next chapters.

The very young child senses the world all around him, both as a place and as the sum of human experience. It seems mysterious, perhaps a little dangerous, but also inviting, exciting, and everywhere open and accessible to him. This healthy and proper sense is part of what may cause some child psychologists to talk, unwisely I believe, about "infant omnipotence." Little children know very well that they are very limited, that compared to the people around them they are very small, weak, helpless, dependent, clumsy, and ignorant. They know that their world is small and ours large. But his won't always be true. They feel, at least until we infect them with our fears, that the great world of possibilities outside their known world is open to them, that they are not shut off from any of it, that in the long run nothing is impossible.

My grandfather used to say of certain people, "Know nothing, fear nothing." We tend to think of this of little children. We see their long-run fearlessness, their hopefulness, as nothing but ignorance, a disease of which experience will cure them. With what synicism, bitterness, and even malice we say, "They'll learn, they'll find out what life is soon enough." And many of us try to help that process along. But the small child's sense of the wholeness and openness of life is not a disease but his most human trait. It is above all else what makes it possible for him – or anyone else – to grow and learn. Without it, our ancestors would never have come down out of the trees.

The young child knows that bigger people know more about the world than he does. How they feel about it affects, and in time may determine, how he feels about it. If it looks good to them, it will to him.

The young child counts on the bigger people to tell him what the world is like. He needs to feel that they are honest with him, and that, because they will protect him from real dangers that he does not know or cannot imagine, he can explore safely.

We can only grow from where we are, and when we know where we are, and when we feel that we are in a safe place, on solid ground.

We cannot be made to grow in someone else's way, or even made to grow at all. We can only grow when and because we want to, for our own reasons, in whatever ways seem most interesting, exciting, and helpful to us. We have not just thoughts but feelings about ourselves, our world, and the world outside our world. These feelings strongly affect and build on each other. They determine how we grow into the world, and whether we can grow into it.

To throw more light on these ideas, to help us see them more clearly, let me quote, the first of many times, from George Dennison's *The Lives of Children,* the wisest and most beautiful book about children and their learning that I know.

> There is no such thing as learning except (as Dewey tells us) in the continuum of experience. But this continuum cannot survive in the classroom unless there is reality of encounter between the adults and the children. The teachers must be themselves, and not play roles. They must teach the children, and not teach "subjects."
>
> The experience of learning is an experience of wholeness. The child feels the unity of his own powers and the continuum of persons. His parents, his friends, his teachers, and the vague human shapes of his future form one world for him, and he feels the adequacy of his powers within this world. Anything short of this wholeness is not true learning.

"Continuum of experience" is a phrase I will use many times in this book. It means both the fact, and our sense of the fact, that life and human experience, past, present, and future, are one whole, every part connected to and dependent on every other part. "Continuum of persons" means that people are a vital part of the whole of experience. In speaking of "the natural authority of adults," Dennison says that children know, among other things, that adults "have prior agreements among themselves." This is a good way of saying in simple words what is meant by a culture. The child feels that culture, that web of understandings and agreements, all around him, and knows that it is through the adults – if they will be honest – that he can learn how to take part in it.

Of children learning to speak, which, as I keep reminding teachers, we must by any standards see as being vastly harder than the learning to read we do so much worrying about, Dennison says:

> Crying is tne earliest "speech." Though it is wordless, it is both expressive and practical, it effects immediately environmental change, and it is accompanied by facial expressions and "gestures." All these will be regularized, mastered by the infant long before the advent of words.
>
> Two features of the growth of this mastery are striking:
>
> 1. The infant's use of gestures, facial expression, and sounds is at every stage of his progress the true medium of his being-with-others. There is no point at which the parents or other children fail to respond because the infant's mastery is incomplete. Nor do they respond as if it were complete. The infant quite simply, is one of us, is of the world precisely as the person he already is. His ability to change and structure his own environment is minimal, but it is real: we take his needs and wishes seriously, and we take seriously his effect upon us. This is not a process of intuition, but transpires in the medium he is learning and in which we have already learned, the medium of sounds, facial expressions, and gestures.
>
> 2. His experimental and self-delighting play with sounds – as when he is sitting alone on the floor, handling toys and babbling to himself – is never supervised and is rarely interfered with. Parents who have listened to this babbling never fail to notice the gradual advent of new families of sounds, but though this pleases them, they do not on this account reward the infant. The play goes on as before, absolutely freely.
>
> The infant, in short, is born into an already existing continuum of experience... He is surrounded by the life of the home, not by instructors or persons posing as models. Everything that he observes, every gesture, every word, is observed not only as action but as a truly instrumental form. [In short, as one of a great series and complex of actions, all tied together, with real purposes and consequences, one undivided whole of life and experience around him.] It is what he learns. No parent has ever heard an infant abstracting the separate parts of speech and practising them... A true description of an infant "talking" with its parents, then, must make clear that he is actually taking part. It is not make-believe or imitation, but true social sharing in the degree to which he is capable.

Albert North Whitehead wrote, in *The Aims of Education:*

> The first intellectual task which confronts an infant is the acquirement of spoken language.

> What an appalling task, the correlation of meanings with sounds. It requires an analysis of ideas and an analysis of sounds. We all know that an infant does it, and that the miracle of his achievement is explicable. But so are all miracles, and yet to the wise they remain miracles.

In the same book he wrote that we could not and should not try to separate the skills of an activity from the activity itself. This seems to me his way of talking about the continuum of experience. We have not learned this lesson at all. We talk about school as a place where people teach (or try to) and others learn (or try to, or try not to) the "skills" of reading, or arithmetic, or this, that, or the other. This is not how a child (or anyone else) learns to do things. He learns to do them by doing them. He does not learn the "skills" of speech and then go somewhere and use these skills to speak with. He learns to speak by speaking.

When we try to teach a child a disembodied skill, we say in effect, "You must learn to do this thing in here, so that later on you can go and do something quite different out there." This destroys the continuum of experience within which true learning can only take place. We should try to do instead in school as much as possible of what people are doing in the world.

THE WORLD BELONGS TO US ALL

Another idea I want to stress, that is closely and deeply connected with everything else I will say in this book, is the idea of *belonging.* This is a way of saying what I have in other words said about the yound child – that he feels the world is *open* to him. But another quote from *The lives of Children* will show more clearly what this feeling can mean to the learner, or what the lack of it may mean.

> Let us imagine a mother reading a bedtime story to a child of five... We can judge *the expansion of self and world* [italics mine] by the rapt expression of the face of the child, the partly open mouth and the eyes which seem to be dreaming, but which dart upward at any error or omission, for the story has been read before a dozen times. Where does the story take place? Where does it happen in the present? Obviously in the mind of the child, characterized at this moment by imagination, feeling, discernment, wonderment, and delight. And in the voice of the mother, for all the unfolding events are events of her voice, characteristic inflections of description and surprise. And in the literary form itself, which might be described with some justice as the voice of the author.
>
> The continuum of persons is obvious and close. The child is expanding into the world quite literally through the mother... here the increment of *world,* so to speak, is another voice, that of the author... Because of the form itself, there hover in the distance, as it were, still other forms and paradigms of life, intuitions of persons and events, of places in the world, of estrangement and companionship. The whole is supported by security and love.
>
> There is no need to stress the fact that from the point of view of learning, these are optimum conditions. I would like to dwell on just two aspects of these conditions, and they might be described, not too fancifully, as *possession* and *freedom of passage.*
>
> Both the mother in reading the story, and the author, in achieving it, are *giving* without any proprietary consciousness. The child has an unquestioned right to all that transpires; it is of his world in the way that all apprehendable forms are of it. We can hardly distinguish between his delight in the new forms and his appropriation of them. Nothing interferes with his taking them into himself, and vice versa, expanding into them. His apprehension of new forms, their consolidation in his thoughts and feelings, is his growth... and these movements of his whole being are unimpeded by the actions of the adults.

Compare this experience with a description of Jose, an illiterate twelve-year-old boy with whom Dennison worked at the First Street School in New York.

> [Jose] could not believe, for instance, that anything contained in books, or mentioned in classrooms, belonged by rights to himself, or even belonged to the world at large, as trees and lampposts belong quite simply to the world we all live in. He believed, on the contrary, that things dealt with in school belonged somehow to school... There had been no indication that he could share in them, but rather that he would be measured against them and found wanting... Nor could he see any connection between school and his life at home and in the streets.

Found wanting! Not long ago a college professor, in a letter in response to an article of mine, said in defense of college entrance examinations that many students were"*not equal* to the college experience." (Italics mine.) But here, in a very specific example, is what the feeling of being shut out, and later allowed in, meant to Jose:

> ... one day we were looking at a picturebook of the Pilgrims. Jose understood that they had crossed the Atlantic, but something in the way he said it made me doubt his understanding. I asked him where the Atlantic was. I thought he might point out the window, since it lay not very far away. But his face took on an abject look, and he asked me weakly, "Where?" I asked him if he had ever gone swimming at Coney Island. He said, "Sure, man!" I told him that he had been

swimming in the Atlantic, the same ocean the Pilgrims had crossed. His face lit up with pleasure and he threw back his head and laughed. There was a note of release in his laughter. It was clear that he had gained something more than information. He had discovered something. He and the Atlantic belonged to the same world! The Pilgrims were a fact of life.

Every so often, at a meeting, or to a group of people, I try to read that story. I can get as far as Jose's laugh, but then I choke up and have to stop. Perhaps without meaning to, perhaps without knowing that we are doing it, we have done a terrible thing in our schools, And not just in the slums of our big cities. Reviewing Dennison's book in *The New York* Review of Books, I wrote.

> Our educational system, at least at its middle – and upper middle class layers, likes to say and indeed believes that an important part of its task is transmitting to the young the heritage of the past, the great traditions of history and culture. The effort is an unqualified failure. The proof we see all around us. A few of the students in our schools, who get good marks and go to prestige colleges, exploit the high culture, which may of them do not really understand or love, by pursuing comfortable and well-paid careers as university Professors of English, History, Philosophy, etc. Almost all the rest reject that culture wholly and utterly.
>
> The reason is simple, and the one Dennison has pointed out – their schools and teachers have never told them, never encouraged or even allowed them to think, that high culture, all those poems, novels, Shakespeare plays, etc., belonged or might belong to them, that they might claim it for their own, use it solely for their own purposes, for whatever joys and benefits they might get from it. Let us not mislead ourselves about this. The average Ivy League graduate is as estranged from the cultural tradition, certainly those parts of it that were shoved down his throat in school, as poor Jose was from his Dick and Jane.

It is our learned men and their institutions of learning, and not our advertising men or hucksters of mass entertainment, who have taken for their own – and by so doing, largely destroyed for everyone else – the culture and tradition that ought to have belonged to and enriched the lives of all of us.

PERSPECTIVE

"And he gave it for his opinion, that whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country than the whole race of politicians put together. . . ."

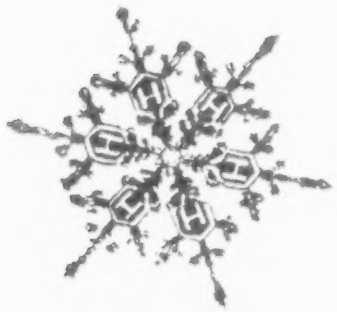
- Jonathan Swift
(1667 - 1745)

"Earth is here [Australia] so kind, that just tickle her with a hoe and she laughs with a harvest. . ."

"He is one of those wise philanthropists who, in a time of famine, would vote for nothing but a supply of toothpicks. . ."

– Douglas Jerrold
(1803 – 1857)

HEADLINE



'Green Revolution' Most Significant Of This Decade

By Richard Critchfield

JAKARTA – The "green revolution" is more than just an agricultural transformation. It also is a very rapid cultural evolution – perhaps even upheaval – in hundreds of thousands of villages all over the world.

The "hundreds of thousands" give me a little pause, since my own experience has been almost entirely limited to two villages where I have been living much of the past year: Ghungrali-Rajputan, a prosperous, wheat-producing community on northern India's Punjab plain, and Pilangsari, a relatively poor rice-growing village on the banks of the Tjimanoek River in western Java.

The two villages and the reaction of their inhabitants toward the green revolution were strikingly different.

The robust, down-to-earth Punjabis, in their traditional pursuit of the good life, were eager to modernize and mechanize and enjoy the material benefits of Western technology. And all but the elderly seem fully prepared to pay the cultural price.

The mystical, artistic and highly cultured Javanese peasantry were taking to the new seeds with conspicuous reluctance, and, one felt, only out of economic necessity. Among several villagers the new technology was viewed, and rightly, as a direct threat to the traditional Javanese belief and behavior system with its distinctive style of life and human relationships.

It was not surprising that in Punjab the farmers themselves were taking the lead in innovation and chafing at the Indian government's slowness to adopt to change. In Java it was the Indonesian government which was using much of the pressure and means of persuasion at its command to get villagers to grow the new rice.

Opting for Cash

But in both villages an almost identical economic process was taking place: There was a distinct shift away from traditional systems in which the poor landless people of the village received a fixed part of the corp in return for labor. Instead more and more farmer-landowners were opting for simple cash payments.

This movement toward a money economy is built into the green revolution.

The new seeds – whether a farmer is growing wheat, rice or maize – require much heavier use of water, chemical fertilizer and, in the case of rice, insecticides.

Water may be provided by expanded government irrigation systems or a privately owned tube well, but both require a greater investment by the farmer than in the past.

But the big cash outlay, needed each sowing season, is for fertilizer. This means having a sufficient marketable surplus each harvest to raise enough cash for the next crop.

Automatically anyone growing the new varieties has to think in terms of money, economy of operations (especially labor costs) and returns. And when an economic system uses money, it is not long before the value system begins to depend on money too.

In a traditional village, where the social structure is based on mutual interdependence, whether between the Jat owner-farmer caste and their untouchable laborers in the Punjab or between the modest landowners and their poorer kinsmen in Java, this tends to drastically displace human values.

In Ghungrali, for instance, where the poorer two-thirds of the villagers were landless untouchables, a sense of community, harmony and security always had been preserved by the caste structure, with its carefully evolved system of mutual rights, obligations and responsibilities. In return for their labor, the untouchables were guaranteed a certain amount of the

'GREEN REVOLUTION' MOST SIGNIFICANT OF THIS DECADE By Richard Critchfield *WASHINGTON SUNDAY STAR* (Reprinted By Permission © 1970

wheat crop each year and the right to freely graze their cattle.

Cultural Crisis

The cultural crisis came when the Jats felt compelled by the economics of growing the new wheat to put their laborers on a cash-payment basis. The untouchables refused to accept this, a mutual boycott followed (it has since ended) and the Jats, for the first time in a thousand years, refused to let the untouchables graze cattle on their land.

In Pilangsari, a similar crisis is coming. Much of the rice harvest in Pilangsari is now carried out under what is called the "tjeblokan" system, whereby a group of poor relatives or fellow villagers both plant and harvest the rice crop of an often modest landowner in return for one-sixth of the crop. Under this system, the rice is cut with a tiny razor-like instrument, the ani-ani, which is held in the palm of the hand and is slow and uneconomical. (After the back-breaking wheat harvest in the Punjab, I found it rather like gathering flowers for a bouquet.)

Not surprisingly, the more innovative peasants in the village, who also are growing the new rice, are talking of switching to harvesting with a sickle and putting their workers on a strict cash basis. Certainly, it would be more efficient and economical. It also would undermine a village social welfare system established over centuries.

Government extension workers who visited Pilangsari when I was there openly spoke out against the "tjeblokan" system in favor of cash payments. They also hoped to restrict, through non-issuance of licenses, the number of village performances of the famous Javanese "wajang" shadow play. Here, too, the money could be more economically used for fertilizer and insecticides.

But the "wajang" play is more than popular village entertainment; it is the very heart of classical Javanese culture and the fount of much of its religion, philosophy and moral code.

Delicate Balance

Here then were two villages, distinctly different in race, culture and world view, yet alike in that each – after being in a solid equilibrium for centuries – was now undergoing an agricultural revolution that threatened to destroy the delicate balances by which the village always had held together.

In both, these balances rested on similar customs: The heavy weight of considerations of kinship, the responsibility of the family heads to provide food, shelter and clothing for all who labored in their fields, the tacit right of the landless to graze cattle and gather wood for fire undisturbed, the inherent obligations of mutual assistance, the practice of loans with little interest and hospitality without cost, the stability of the family.

Now all this was changing. One might say that the West had finally and twice reached into these villages during this century. First, with the modern medicine and DDT that in the past 50 years produced a cataclysmic fall in the death rate and created a population explosion (the number of people in both villages had almost doubled in the past generation.) And, second with the agricultural revolution, which is providing much more decisive culturally.

One looks for a reason why this is so. Somehow the fact of more people, even twice as many people in the villages, did not do much to alter its basic culture. Everyone was poorer than before but the old traditions survived. Instead the cultural transformation follows the transformation of agriculture.

It is similar to what happened in Europe in the 19th century when the drive for an agricultural surplus to feed a growing population led to the modernization of agriculture. But this resulted in some 35 million European migrants flooding into the United States. Even the relatively small number of American Negroes displaced by the agricultural mechanization of the South has left the United States its greatest unsolved domestic problem.

But if Ghungrali and Pilangsari are genuinely representative, as I am convinced they are, then one can deduce that the same thing must be happening in all of the hundreds of thousands of villages where the new strains of wheat, rice and maize have been introduced. To name just some of the countries where the new seeds have already had some impact: India, Pakistan, Iran, Turkey, the Philippines, Malaysia, Burma, Indonesia, South Vietnam, Taiwan, Afghanistan, Japan, Kenya, Tunisia, Morocco, Algeria, Libya, Brazil, Mexico, Paraguay (to say nothing of Russia and China where the new wheat varieties are now being tried.)

The question is: In all the villages where the new agricultural technology is being practiced does the economic inperative operate in the same way as in Ghungrali and Pilangsari so as to snap old ties and traditions, forcing peasant-farmers to face the

enormous compulsion of working out new relationships, new meanings to their lives? It is my contention that the answer is "yes" and that the ensuing cultural crisis, the vast mass exodus from the land it will produce and the shock of those who have been uprooted will face the world with a problem of great magnitude by the end of this decade.

Technological Necessity

This is not to decry the green revolution. The point must be made that the growth of population following the spread of modern medicine made the adoption of modern agricultural technology a necessity for most of the poor nations.

To find another historical parallel for what seems to be happening in countless villages all over the world one can go back much farther than 19th century Europe to the very beginnings of agriculture in the Tigris-Euphrates, Nile and Indus river valleys. The first Mesopotamian or Egyptian to dig an irrigation ditch, put the first animal into harness or use a traction plow was presumably just trying to feed his family better.

But these technical innovations created new styles of life, new systems of human relationships, led to the first breakthroughs to civilized society, the eventual rise of the West and, in modern times, to the imposition of European culture and technology on the great cities of the whole world, including those of Asia.

Historically left almost untouched these 5,000 years until the green revolution began to take hold just during the last three or four years, have been most of the villages of the world, where two-thirds of the human race now lives.

As a result, some 80 percent of the populations of the poor nations are still engaged in primitive agriculture. In the rich, advanced countries of the West, it is something less than 10 percent.

It has always been clear that at some point in history this gap would begin to close. And that when it did the impact, not only agriculturally and economically but culturally and in terms of the vast migrations of peoples, would be momentous.

Dr. Norman E. Borlaug, who won this years Nobel Peace Prize for his part in developing the strains of grain now contributing to the green revolution, says the world has about 30 years to reduce population growth rates to manageable levels before shortages of food catch up.

Big Families Happier

In India many agricultural technicians, both American and Indian, maintain India will be lucky to get two or three years before the population growth rate of 2.5 percent and the real food demand growth rate of 3.5 percent exceed the increases in agricultural output.

My own observations lead me to doubt the whole notion of any expectation of success in population control.

In both the villages where I lived, Ghungrali and Pilangsari, the incentives, both human and economic, among the landless laborers to have large families appeared to outweigh the disincentives. Unlike the world's educated middle classes or prosperous farmer-landowners, who have taken to family planning out of a desire to educate their children or perpetuate their farm into the future as a viable economic until, the poor majority of the peasants appeared to have a real interest in having as many children, or as many potential wage earners in their household, as possible. With few exceptions the poorest peasants were not worried about educating children who traditionally start work as farm laborers and breadwinners at the ages of 13 or 14.

In both villages there was a heavy cultural emphasis on fertility and procreation and government propaganda on behalf of family planning seemed no match for the pressures on a young bride to validate her own position by having many sons, and as soon as possible. One of the Indian government's birth control slogans is "The small family is a happy family." In reality, in the villages, the reverse seemed true; it was the large, teeming households, with plenty of daily wage earners and the security of numbers that were the happier.

In Ghungrali, there was considerable impact from government programs promoting knowledge of birth control. A huge billboard praising the two to three-child family greeted you as you entered the village. Everyone seemed to have an awareness of the pill and intrauterine devices and the government's catchy slogan of "Do ya teen, bas!" ("Two or three, finish!") was as familiar as a commerical jingle would be in America. In contrast, in Pilangsari, there was almost no awareness of the government's family planning program or of either the pill or IUD.

Yet in practice, birth control seemed much the same in both Ghungrali and Pilangsari. The more prosperous, better educated landowners had smaller

families based on motives of enlightened self-interest and the poorer, landless laborers had big families, also in terms of their own self-interest.

In the city of Jakarta, family planning has been practiced by 15,000 women, presumably middle-class, educated, and civic-minded ladies. But Jakarta is a city of almost 5 million people.

"I can't think about that. Wah, I'd go crazy," answered Husen. "So maybe I'd like to go to the moon too. I won't even ride in a motorcar before I die." (The father of four, three of whom died in childbirth or infancy, Husen hopes to keep on having children to insure the survival of at least three more.)

Thus it seems inevitable there will be at least another one billion people in the poor countries alone by 1985 and that the number of those who will depend upon agriculture for their livelihoods will rise about 50 percent.

If the green revolution follows the pattern set by the agricultural revolution in Europe in the 19th century, the greatest exodus from the land and migration to the cities in history is about to commence.

British economist Barbara Ward has said the prospect is of "a tidal wave, a Hurricane Camille of country people that threatens to overwhelm the already crowded, bursting cities. It is not so much immigration as inundation."

'Marginal' Men

For the past two years the world Food and Agriculture Organization in Rome has taken the position that the food problem of the 1960s has become the unemployment problem of the 1970s. The netherlands' Addeke H. Boerma, the FAO's director general, told the second meeting of the World Food Congress in The Hague in July that unless the green revolution was carefully managed, the result might be "a conflagration of violence that would sweep through millions of lives.

In September, World Bank Director Robert S. McNamara reported to his board of governors that "the poorest quarter of the population in developing lands risks being left almost entirely behind in the vast transformation of the modern technological society." McNamara said "the 'marginal' men, the wretched strugglers for survival on the fringes of farm and city, may already number more than half a billion. By 1980 they will surpass 3 billion, by 1990, two billion. Can we imagine any human order surviving with so gross a mass of misery piling up at its base?"

It is hard to see how the green revolution could be carefully managed, as Dr. Boerma urges. Governments are up against the same problem they encounter in trying to check population growth: the self-interest of an individual peasant, usually a man with extremely limited horizons whose confident belief in his position in the world and his relationship with all humanity has been fixed over centuries by very old, stable, traditional village. cultures.

Wretchedness Doubted

But this has its postive aspect. When McNamara speaks of "wretched strugglers for survival," he seems to hit a false note. "Strugglers for survival?" Yes. "Wretched?" I would say no if one is taking in all of the half-billion "marginal" men he says there are already.

I am willing to venture that most of these still strongly identify with a village and that village's culture even if they actually have lived for years in a great Asian city as a coolie, a betjak driver or in other menial work. As long as they retain this sense of cultural identity, this sense of having a place in a universe with fixed cultural values, no matter how poor they are, I do not think they can accurately be called wretched.

And here to me is the real meaning of the green revolution: That for the past few decades the old structure of the old village society in vast stretches of Asia, Africa and Latin America has begun to crumble. The introduction of modern medicine and the population explosion that followed gave village culture a rude shock and weakened the aged foundations. The new seeds and the transformation of agriculture and the village economy they require could be the climactic blow.

All over the poor two-thirds of the world there may be a mighty cultural and economic collapse leaving millions of helpless, bewildered people without homes. There would not only be such a vast army of emigrants as the world has never seen but also an army of peasants alienated from their culture.

That we might be faced not only with a massive flood of people to the cities, but also with a wholly unprecedented pheonomenon of global cultural alienation, is the frightening part.

HEADLINE

HEALTH MENACE CREATED BY HIGH DAM AT ASWAN

By Claire Sterling

THERE HAS ALWAYS been bilharzia in Egypt: parasites' eggs have been found in mummified viscera from Tutankh-Amen's tomb. But it did not become the plague it is until men made it so by introducing extensive irrigation at the start of this century. Even then the number of carrier-snails was kept down by the annual Nile floods washing them out to sea, until the High Dam was sealed at Aswan in 1964, ending the floods forever.

The snail-carrier of bilharzia (known in medical circles as schistomiasis) cannot survive for long in fast-flowing rivers. It is most at home in placid waters, where it may be carried by migrating birds or the wind.

Once settled, the snails can multiply at a rate which will increase their numbers 50,000-fold in four months. Lake Nasser, forming behind the High Dam, is thickly infested with these snails along its entire 300-mile shoreline. That is not yet the calamity it might be only because hardly anybody lives there. Infestation is much the same in the canals dug since the High Dam was built, as in all the others lacing the country.

THE SNAIL does not attack human beings. It simply plays host to the prickly-spined blood flukes which do. The fluke's larvae need only be deposited in the water by an infected person's urinating, defecating or merely bathing, whereupon it homes in on the snail to lie in wait for the next human being to come along. Any healthy man, woman or child setting foot in these infested waters can pick up the fluke without so much as a bite or scratch in warning; and once lodged in the victim's bloodstream, the fluke lives happily ever after, perpetually copulating.

A man can die of bilharzia, but is more often condemned to live in growing pain and exhaustion. The chronic sufferer becomes steadily weaker from stomach cramps and damage to the heart, lungs, liver. he may contract cirrhosis, bladder and kidney

There is no lasting cure for bilharzia, since anybody who shakes it off in the morning can pick it up again before nightfall. The safest temporary cure is an old-fashioned tartar emetic which must be administered in twelve weekly intravenous injections causing violent pain and vomiting. Although newer drugs keep coming onto the market, none is altogether satisfactory and some are singularly unsatisfactory, tending to produce maniacal impulses, hallucinations, and an uncontrollable impulse to jump out of windows.

FOR ALL the efforts made by Egyptian and U.N. agencies, therefore, endemic bilharzia persists. Even before the High Dam was built, 14 million of Egypt's then 40 million people had it; one out of every ten deaths was caused by it; and the cost to the state in lost working time alone ran to half a billion dollars yearly. No official figures have been released on the number of additional victims since new canals came into being after the High Dam was sealed. But in some areas, such as Kom Ombo just below Aswan, the rate is known to have jumped from zero to 80 per cent. Consultants of the World Health Organization think the national total of fresh cases is somewhere around 2,650,000: an increase of roughly 20 per cent, at an added yearly cost to Egypt of $80 million.

This is not the only health menace created by the High Dam. Less known but potentially more sinister is the threat of killermalaria from the Anopheles Gambia mosquito, the deadliest carrier in Africa. The A. Gambia has a high biting frequency, prefers a human blood meal to any other, feeds on humans a hundred times more than other mosquitoes do, has a higher life expectancy, and can breed with perfect equanimity in anything from a pund or pool to a muddy hoofprint or puddle in an old rubber tire. It is found, all too often, in areas of the Sudan barely fifty miles from the southern shores of Lake Nasser.

HEALTH MENACE CREATED BY HIGH DAM AT ASWAN By Clarie Sterling © (Reprinted by permission, The Washington Post)

infections, cancer; and even if not, he is rarely able to put in more than three hours' work a day.

A fifty-mile hop is nothing to the A. Gambia, which has wandered much deeper into Egypt on occasion, with memorable results. In 1942 it got far enough to infect a million Egyptians, killing 100,000 of them: the World Health Organization calls that epidemic "one of the saddest events in the history of tropical medicine." In reminding Egypt of this experience when Lake Nasser began to form U.N. experts have rendered an invaluable service. For it is was hard enough to catch up with the Anopheles Gambia in 1942, it would be all but impossible should this murderous insect get a foothold now in the vast expanse of Lake Nasser's impounded waters, with all those idyllic inlets and swamps and an endlessly twisting shallow shoreline.

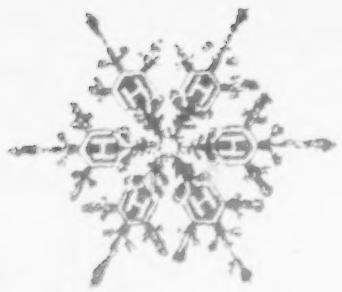
SO FAR, it has failed to show.Vigilance, of a sort, is kept at several malaria stations run jointly by the Sudan and Egypt, at Abue Simbol, Kom Ombo, Edfu, and the High Dam itself. Travellers coming from the Sudan are sprayed with insecticides, though the right kind are not always handy: one U.N. official checking on the check point recently was sprayed with Flit. Since some strains of the Anopheles Gambia have already developed immunity even to DDT, these malaria stations are going to have to do better than that. The situation might improve under steady if discreet U.N. pressure. As things stand now, though, one vicious little mosquito nestling in the tweed pocket of a tireless tourist could put a curse on all Egypt.

PERSPECTIVE

POPULATION INUNDATION

"Population, when unchecked, increases in a geometrical ratio. Subsistence only increases in an arithmetical ratio. . ."

– Thomas Malthus
(1766 – 1834)



Population Resources Environment

THE CRISIS

issues in human ecology

By Paul R. Ehrlich & Anne H. Ehrlich

The explosive growth of the human population is the most significant terrestrial event of the past million millenia. Three and one-half billion people now inhabit the Earth, and every year this number increases by 70 million. Armed with weapons as diverse as thermonuclear bombs and DDT, this mass of humanity now threatens to destroy most of the life on the planet. Mankind itself may stand on the brink of extinction; in its death throes it could take with it most of the other passengers of Spaceship Earth. No geological event in a billion years – not the emergence of mighty mountain ranges, nor the submergence of entire subcontinents, nor the occurrence of periodic glacial ages – has posed a threat to terrestrial life comparable to that of human overpopulation.

Most of the members of modern societies have now seen pictures of the Earth as seen from the vicinity of the moon and they must have a new awareness of the finite size of our planet. In comparison with many celestial bodies, it is a rather small ball of rock. It is also possibly a unique ball of rock, for its surface is populated by a vast variety of living organisms that depend for their existence on a thin film of atmosphere, which is itself, in part, a product of those living things.

If *Homo sapiens* is to continue as the dominant species of life on Earth, modern man must come soon to a better understanding of the Earth and of what he has been doing to it. Yet many people – as a result of the excitement over the successful landings of men on the moon – are better informed (and perhaps more curious) about conditions on the surface of that dead satellite than they are about the damage being done by overpopulation and overdevelopment to the only life-supporting planet we know.

Only recently have Americans been astounded to learn that many millions of their own fellow citizens go to be hungry every night. Most of us, of course, have vague ideas about starvation in India or about Brazilians living in squalid *favelas,* but all too many of us have no real appreciation of the dimensions of the world food problem. Why should we? The concept of one or two *billion* people living on this planet without adequate diets truly staggers the imagination. How can it be that 10 or 20 million people, mostly children, are starving to death each year while we pay some of our farmers *not* to grow food? How many presumably well-educated Americans realize that their pets receive a better diet than hundreds of millions of their fellow human beings? How many are aware that many poor Americans resort to eating pet food as a cheap source of high-quality protein?

Look for a moment at the situation in those nations that most of us prefer to label with the euphemism "underdeveloped," but which might just as accurately be described as "hungry." In general, underdeveloped countries (UDCs) differ from developed countries (DCs) in a number of ways. UDCs are not industrialized. They tend to have inefficient, usually subsistence agricultural systems, extremely low gross national products and per capita incomes, high illiteracy rates, and incredibly high rates of population growth. For reasons that are made clear in this book, most of these countries will never, under any conceivable circumstances, be "developed" in the sense in which the United States is today. They could quite accurately be called "never-to-be-developed countries."

The people of the UDCs will be unable to escape from poverty and misery unless their populations are controlled. Today these countries have larger populations than they can properly support, given their physical and biological resources. Furthermore, their population growth rates make it clear that conditions are going to get steadily and rapidly worse. The populations of most UDCs are doubling every 20-30 years. Consider what it would mean for a country like the Philippines or

"The Crisis" from POPULATION, RESOURCES, ENVIRONMENT: ISSUES IN HUMAN ECOLOGY by Paul Ehrlich and Anne H. Ehrlich. W. H. Freeman and Company. Copyright (c) 1970. Reprinted by permission.

Honduras to double its population in some 20 years. There would be nearly twice as many families in 20 years; today's children would be adults and have their own children. In order to maintain present living standards, such a country must, in two decades, duplicate every amenity for the support of human beings. Where there is one home today there must be two (or their equivalent). Where there is one schoolroom there must be two. Where there is one hospital, garage, judge, doctor, or mechanic, there must be two. Agricultural production must be doubled. Imports and exprots must be doubled. The capacity of roads, water systems, electric generating plants and so on must be doubled. It is problematical whether the United States has abundant capital, the world's finest industrial base, rich natural resources, excellent communications, and a population virtually 100 percent literate. The Philippines, Honduras, and other UDCs have none of these things. They are not even going to be able to maintain their present low standards of living.

Even if some UDCs should manage to maintain their living standards, this will not be acceptable to the people in those countries. The "have-nots" of the world are in an unprecedented position today: they are aware of what the "haves" enjoy. Magazines, movies transistor radios, and even television have brought them news and pictures of our way of life – our fine homes, highly varied diet, and so forth. They have also seen in their own countries our automobiles, airplanes, tractors, refrigerators, and other appliances. Naturally they want to share our affluence. They have what Adlai Stevenson called "rising expectations." But, a few simple calculations show that they also have plummeting prospects. It takes no political genius to guess the results of not just a continual frustration of these expectations, but an actural deterioration of living standards as well. Population pressure has been described as numbers of people pressing against values. For many people in the UDCs there are relatively few values left to press against, and even these are doomed if mankind continues on its present course.

Many people in the UDCs – the Columbian mothers forced by hunger to practice infanticide, the Biafran children in the last stages of starvation, the Indian women who, during the recent Bihar famine, spent days sitting in the sun picking up grains of wheat one by one from railroad beds, and the several hundred thousand residents of Calcutta who live in the streets – have virtually nothing left to lose but their lives. The inhabitants of the DCs have much to lose. Overpopulation right now is lowering the quality of life dramatically in these countries as their struggle to maintain affluence and grow more food leads to environmental deterioration, On most DCs the air grows more foul and the water more undrinkable each year. Rates of drug usage, crime, and civil disorder rise and individual liberties are progressively curtailed as governments attempt to maintain order and public health.

The global polluting and exploiting activities of the DCs are even more serious than their internal problems. Spaceship Earth is now filled to capacity or beyond and is running out of food. And yet the people traveling first class are, without thinking, demolishing the ship's already overstrained life-support systems. The food-producing mechanism is being sabotaged. The devices that maintain the atmosphere are being turned off. The temperature-control system is being altered at random. Thermonuclear bombs, poison gases, and supergerms have been manufactured and stockpiled by people in the few first-class compartments for possible future use against other first-class passengers in their competitive struggles for dwindling resources – or perhaps even against the expectant but weaker masses of humanity in steerage. But, unaware that there is no one at the controls of their ship, many of the passengers ignore the chaos or view it with cheerful optimism, convinced that everything will turn out all right.

THE LEMMINGS' PERIODIC JOURNEYS ARE NOT UNIQUE

By John B. Calhoun

In the current self-destruction cycle of the Norwegian rodents a behavior authority finds other mammals, maybe Man, similar

I have never seen a lemming. At least I have never seen one of those biological entities called *Lemmus lemmus*, the "true" or Norwegian lemming found in countless numbers throughtout the world's northern latitudes. Nor have I ever seen any of the other species of lemmings that inhabit these circumpolar regions. I feel about the little mammals the way humorist Gelett Burgess felt about his purple cow: "I'd rather see than be one."

Perhaps because I have never seen one I can actually see them better. I can define for myself the phrase "lemming pheonomenon," when thousands if not hundreds of thousands of these rodents march to the sea, plunge in and swim out until, exhauseted, they drown. Swept back on the beach, their bleached bones form windrows on the shore.

Norway stands out as the country where the lemming death marches occur most frequently. Every three to four years these migrations take place in one or more places in Norway, as in these pictures taken in the late fall of 1970. Sometimes the migrations are moderate in size and only come to the attention of some isolated village or an inquiring biologist. At other times vast hordes of true lemmings (*Lemmus lemmus*) may invade many towns and even reach Oslo, far from the closest breeding grounds.

Over most of the world the tundra habitat of lemmings covers the lowlands between the zone of permanent ice and snow and the tree line. In Scandinavia, the tundra forms a tongue of lichen, moss, grass, heather, willow and dwarf birch extending far southward down the mountain range. Normally, the rodents avoid permanent rocky, snowy areas above the tundra and birch and coniferous forests below it Between these regions, the low-lying tundra vegetation offers food and protection for the shy, mostly nocturnal creatures. They build their maze of trails, and each year the females rear two or more broods of young. Those born in the spring may themselves bear litters in the summer; those born in the summer start their contributions to the population in autumn. Thus, even though an average animal may live little more than a year, this overlapping of breeding generations permits the lemming population to increase rapidly.

Increase it does. Long before the lemmings begin to overtax their food supplies a general state of unrest develops. More and more of the animals forsake their normal sedentary way of life, wandering about aimlessly, upsetting still sedentary associates. When too many young lemmings avoid the depredations of foxes, hawks and owls and survive to adulthood, increased contacts among them lead to anxiety, strife and an unsettled way of life.

In years of abnormal population increase the degree of wandering reaches such a scale that more and more individuals begin pushing out of their normal tundra home. Some few move up over the inhospitable snowfields. More move down into the adjoining birch forests at lower elevations.

During times of approaching population peaks the great majority of those who move downward into the birch forests never return to their homeland. Many die where they have overwintered. They are particularly stressed; many bear scar tissue from wounds inflicted earlier by their more dominant associates.

As spring approaches, a new wave of emigrants takes the road down the mountain. This even larger mass consists of young born during the fall and the long winter of breeding under the snow cover. These young are physically healthy and fat, and their departure seems motivated by the general unease: They seek to alleviate this by moving into less desirable habitat.

Each lemming sets its own course irrespective of its fellows. Gradually, the animals lose their nocturnal ways. They amble across openings, one after another, at irregular intervals, seeming not to care about predators. When they meet each other they merely

Research psychologist at National Institute of Mental Health, Dr. Calhoun was subject of a Smithsonian article in April. His artificial "mouse worlds," deliberately overcrowded, focus attention on Man's population explosion. *Smithsonian, (c) Copyright Smithsonian National Associates 1971.*

bark or scuffle briefly before each goes his own way.

Soon this second major wave begins to encounter the remnants of the earlier one in the birch forest. This contact sends the first migrants farther down the mountain into the coniferous forest zone. Each wave of lemmings forms a broad, ill-defined band several miles in depth. Here local concentrations often build up as the migrants pause to eat at forest clearings where food is more plentiful. Finally, the numbers in these pockets increase until fresh unease drives them on down the mountain.

Each onward moving group adds impetus to the groups below. They too renew their downward course. Channeled by the narrowing valleys, these loose groups gradually coalesce, and the growing masses approach the cultivated land at the bottom of the valley.

By this time some remarkable changes in behavior stand out. Earlier in their travels lemmings skirt sizable bodies of water. But by the time they reach the lowlands their reluctance to enter ponds and small lakes is tempered. Each lemming creeps down to the water, pulls back and waits a few minutes while more and more gather behind. They make several approaches and withdrawals. Finally, each seems overcome by some compulsion to resume its onward movement following the same direction of the valley.

The animals plunge in, irregularly, with little evidence of a coordinated signal to proceed. Buoyed by fat and fur, they splash along and most eventually reach the opposite shore of still lakes which may be as much as several hundred yards across.

Gradually, the rodents lose nearly all reluctance to enter strange sitiuations. By the time they have reached the seaside villages, waves of them are further compacted. They still move more at night than day, so it often happens that villagers awaken to find yards and streets swarming with them. Due to the irregularity of the migrations in any particular valley, as much as 18 years may have elapsed since lemmings have been seen.

"Where did they come from?" people ask. Certainly not from the surrounding pastures where none were seen the day before, when the cows were brought in. Certainly not from the surrounding woodland, where wood choppers had been.

"From the skies! Yes, they must have come from the skies. God caused them to be rained down from above as a curse on the village." Such was the myth that took form by the 15th century and still tempted the minds of many into the 20th. Cats and dogs were encouraged to kill the alien pests. Boys with brooms joined the fray. "Shovel them up! Get rid of them! Let's have no reminders of our iniquities!"

Through and around villages the lemmings proceed to the sea. Then, with diminished hesitancy, they plunge in, one by one. They swim ever outward along the trajectory dictated by their long journey. Like a random polka-dot fabric spread over the sea the swimming bodies (can we still call them lemmings?) extend for thousands of yards by the time the last enters the water. Ever farther outward they persist, perhaps a million or more. Finally, even the strongest can paddle no more. None survives this final plunge to return homeward. Quiet returns to the shores. Only the mat of bones remains as a bleak reminder of the lemming phenomenon.

To the present day, students of the lemming migrations paraphrase Charles Elton's query of 30 years ago: "How [could] evolution by natural selection have maintained the migratory stimulus when all those that respond to it perish, and all that do not are survivors?" As long as that query confronts scientists, we are little better off than the promulgators of the "falling-from-the-sky" myth of five centuries ago.

So what is a lemming? Is it an animal or an idea?

Over most of the northern hemisphere – and where there are few valleys descending from the uplands – lemmings rarely migrate at the peak of their population increase. They may wander outward, diffusely, for relatively short distances. Most die from a kind of "shock disease," an overtaxing of the adrenal-pituitary system which normally enables them to cope with unexpected stresses. Even in Norway, many lemming population peaks are *not* followed by mass migration to the sea.

What is a lemming? Is it more than one of the many lemming species, even that particular *Lemmus lemmus* that inhabits Norway?

Since 1750, hunderds of records tell of the common North American gray squirrel making mass migrations similar to those of Norwegian lemmings. Out of the hills of western Connecticut squirrels moved west and down the valleys until they encountered the Hudson River. They plunged in and many drowned before reaching the opposite side. Many even took to the Bear Mountain Bridge, or hitched rides on ferryboats. Similar migrations have come out of the Ohio hills following river valleys to the Ohio River where many also died attempting to swim across. The Mississippi River also has been the Waterloo of other migrating hordes of gray squirrels.

What is a lemming? Can it be any kind of mammal which engages in a mass movement in a fixed direction with such obsession that it readily enters all environents it would normally avoid?

Several year ago I was reminded of lemming migrations while involved in some studies of small mammal populations. We were finding that the entire community of mice and shrews living in a forest were woven into an intricate fabric of social relations. In this fabric, certain dominant red-backed mice maintained the largest ranges, overlapping each other to form a chainmail-like pattern across the forest. We have learned that ranges become smaller down the social scale, with much less overlap between one individual's range and that of the nearest neighbor of its own kind. In fact, at the bottom of the scale, usually abundant long-tailed shrews maintain such small ranges that they are rarely trapped during the normal short-term census trapping.

However, after 25 to 30 days of trapping, a different picture emerges. The dominant animals with large ranges are trapped most easily and are thus mostly removed within a few days. They can no longer inhibit other species. Members of subordinate species then enlarge *their* ranges and are themselves trapped. Finally, a whole piece of this social cloth within and just adjacent to the trapping plot is cut out. Few former residents remain.

This pheonomenon of interdependencies within small mammal communities generated an idea of inducing a lemming-like mass movement. Several hundred traps were set in a 30-acre plot. They removed nearly all of the residents within 30 days and so created a social void. The layer of animal "fabric" adjacent to the void then moved in and in turn was trapped. This initiated a chain reaction that ripped apart the entire social organization.

As each strip of animals moved toward the void, their neighbors occupied their vacated homeland, moving in as if to escape from social pressures of others still farther out. The migrations ceased shortly after trapping in the central area ended. But it was clear that social disruptions, other than those which occur in Norway, can produce a directional movement.

What is a lemming?

Can a "lemming" be defined as any animal which can be induced to emigrate in large numbers from the homelands of its birth? That was an idea I clung to until two months ago. I really should know better than to put such stock in each new notion. That's the way of science; you hold fast to each new formulation as if it were ultimate truth, and yet down deep you know that at best it's a leaking boat. This time I've sunk myself by launching an even sturdier boat of ideas.

Overcrowded mouse worlds give clues

Perhaps you have heard of my "horrible mousery," my "paradise" for house mice *(Smithsonian,* April 1970). It really is a mouse utopia; it provides for all their physical needs. But unlike the lemming ranges of Norway, the walls around this utopia allowed no escape when the mouse population began to exceed tolerable limits.

This habitat contains 16 apartment units. Each apartment contains 16 rooms. As it turned out, the mice decided how many could live comfortably in each apartment. They set the limit at ten, for they really don't like crowding. Thus, 160 adult mice filled up all the "social space." Before the population had increased to this number from the initial eight colonizers, those who were old enough to breed produced more than 400 even younger mice. When these matured they had no place to escape to physically – and there was no place to go socially except for a very few who managed to replace some of their aging brethren in the social structure.

Their reaction was to withdraw psychologically, to huddle in motionless masses in the less-used space on the floor. True, these mice were extremely stressed, but mostly from the bursts of violent attacks that they directed at each other. The dominant mice paid little attention to them. When the younger mice's violence subsided, they became hollow shells, not participating in any social life with the favored few.

Mice too stressed for mating

Still the socially settled few kept breeding, just as the lemmings do in that last fall and winter before their major march to the sea. In this last frenzy of reproduction 1,600 more mice were spewed out into this closed environment. A replica of "spaceship Earth?" They too found no social "rooms" in which to mature. As each member of this horde grew physically it began to express its natural behavior, trying to take part in sex and other acts of social intercourse that are necessary for survival of the species. But rarely was a mouse able to complete this action before it was interrupted by some associate.

Only the simplest behaviors, such as eating and drinking, were ever carried to completion. The mice never really learned to mate or fight. Never fighting, never competing for mates, never protecting young,

they never knew stress. Most matured into passive blobs of protoplasm, physically healthy but socially sterile.

Despite physical maturity these beautiful mice remain as juveniles, frozen in a childlike trance. As young mice they are curious about strange objects and strange stiuations. The biggest strange object they encounter is me. I can go into the large central space of the habitat and walk slowly about in circles. Rapidly, a mass of several hundred of these beautiful mice gather about my feet and trail along as I move.

Earlier in the history of the population, when youn mice were maturing normally, they would sometimes approach my feet, then accept them as an irrelevant aspect of their environment and pay no attention to them. But these poor beautiful mice never learn; each day they follow human feet about as if they had never seen them before. The youngest of the mice are over eight months old, or 25 years as human span is measured, yet they behave like novice 30-day-old mice, recently weaned. Is the story of the Pied Piper so mysterious after all?

What is a lemming?

Perhaps these beautiful mice are more "lemming" than lemmings. They live in a world of abundant food. Lack of food doesn't make a lemming. They live in a world precluding migration. Failure to migrate doesn't make a lemming. They are all still happily living – physically, that is. Destroying one's life doesn't make a lemming.

Yet these are denizens of a "horrible mousery." And above all, they are voiceless. They are deathly quiet. Lost are the plaintive squeaks of recognition, the higher squeaks of inquisitive anxiety, the shrill squeaks accompanying more intense social involvement. A pallor of silence hangs over the flaccid following mass.

I am coming to believe that they are truer lemmings than those Norwegian ones who follow the long downhill route to the sea.

Lemmings are lemmings. Squirrels are lemmings. Mice are lemmings. Are there lemmings in our metropolitan tundras – silent shadows of the selves they might have been, ready to follow in unquestioning masses any flickering figment on a glassy screen? Are they ready to bring civilization to suicide?

Mass suicide, the phrase applied to lemmings, has haunted man for centuries. We need not quibble about the strict applicability of the word suicide in this context. Undoubtedly, the lemmings have no consciousness of their impending doom when they plunge into the sea. But suicide, particularly mass suicide, has a far broader meaning. It is a joint death participated in by many when the customary way of life of a species is threatened. For the Norwegian lemming faced with overpopulation, the exodus and death of many provide an opportunity for rejuvenescence by remnant groups. Their hereditary way of life can be renewed as their tundra environment recovers from its former overuse. With every mass death, then, there *may* be a rebirth.

Man's way of life differs from that of all other animals. Periodically he has been faced with crises, not of numbers, but of ideas. Old ways became outmoded, new ones emerged. We have always had the choice of which would survive, which would be allowed to "commit suicide." Sometimes the new ways drew the lot of suicide and areas of the world were left to stagnate and die. Sometimes areas adopted new ways that enlarged human potential.

Let us go back to my mice "lemmings," the beautiful ones. For more than a generation now they have failed to reproduce their kind. No young mice have appeared, and all present evidence suggests that they will age and die without progeny. They are "overliving." They might as well have died at birth. The population seems doomed. They have already committed suicide.

We, if we are to be called human, produce ideas as well as ourselves. Whenever we fail to produce new ideas and utilize them we commit suicide.

Our crisis of ideas

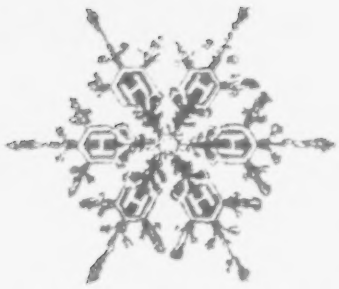
Right now we stand at the first dual crisis in our history, a crisis of both ideas and numbers. Previously our letting outworn ideas die, and new ones live, enabled more and more people to populate the earth. This epoch of evolution is nearing an end. We face an entirely new crisis: How can the potentiality of the average individual continue to expand as it has in the past when he no longer has the option of linking more and more people into a communication network to generate and spread ideas? That is the real question facing the world today.

In this country the time is no more than five years away until we will know if we are going to face this question of rebirth of ideas. That time is 1976 – our nation's bicentennial. Then we will either "overhallow" the past and so dedicate ourselves to the suicide of overliving, *or* we will open up a new era of evolution marked by increased creativity, awareness and compassion.

What is a lemming?

PERSPECTIVE

What kind of noise annoys an oyster. . .?



SOUNDING OFF ABOUT NOISE

THE TYRANNY OF NOISE: The World's Most Prevalent Pollution – Who Causes it, How it's Hurting You and How to Fight it.
By Robert Alex Baron

Reviewed by Robert Cassidy

The reviewer is a city planner in Northern Virginia who writes occasionally about environmental problems.

Last spring was a time for celebration for the old conservation crowd.

You remember the old conservation crowd. They were the fresh air freaks, the campers and woodsmen who, with a few scientists and some proverbial little old ladies in tennis shoes and men in khaki shorts and knee socks, would go around with grim, foreboding stares on their faces, warning everyone that we were shooting hell out of our natural resources and biological life cycles.

Until last spring, nobody listened, at least not enough to do anything serious about the problems – overpopulation, depletion of resources – that we now lump into the litany of the new movement, the environment (or, as the buttons proclaim, "ENVIRONMENT!").

Then – wham! Everyone got into the act, including a group of Long Island high school students who decided to do their bit to make the world safe for man and other threatened species.

Armed with pads and pencils, and the assurance that righteousness was on their side, the students set out to interview residents of the areas bordering Kennedy and LaGuardia airports.

Unfortunately, the kids did not get very far with their interviews. The noise from the jets was so loud they could not talk to the people.

Robert Alex Baron knows all about that. His book, *The Tyranny of Noise,* is the most readable, intelligent, and comprehensive study of the noise pollution problem to date. It should be read and studied by urban planners, public officials, engineers, and the public.

Baron received his own initiation into the science and politics of noise one morning in 1964, when he was awakened by the ra-ta-ta-tat of a jack hammer below his Sixth Avenue apartment. The New York Transit Authority, which was building an extension of the subway line, assured him that the construction noise was only temporary.

Three years later, after complaining to all the branches of city, state, and federal government he thought might have some influence in stopping the noise, Baron found that nothing could be done.

Since 1964, he has become the leading crusader of the anti-noise forces. He helped organize a citizens' group, addressed national and foreign conferences, conducted research, and lobbied for anti-noise interests. His schedule was so full that he had to give up his job as a theater manager.

What he has found about noise pollution is, if not startling, certainly depressing. Noise levels in urban areas are increasing yearly; even supposedly rural areas are being permeated with aircraft and industrial noise. Noise has a profoundly unsettling effect on the entire human body, not just the ear.

"Noise, at even moderate levels, forces a systemic response from the total organism," Baron writes. "It is not only the sense of hearing that is involved. What is also involved is what happens after the brain receives the sound signal. The brain places the body on a war footing. The repetition of these alerts is exhausting. It depletes energy levels; it can cause changes in the chemistry of the blood, in the volume of the blood circulation; it places a strain on the heart; it can be a form of torture. It can so weaken the body's defense mechanisms that disease can more readily take hold. The organism does not adapt to noise, it becomes inured and pays a price. The price of this 'adaptation' is in itself a hazard to health."

Baron's recommendations for solving the problem are politically naive. He advocates setting up a National Commission on Noise, but certainly he has not been so disengaged from the American political scene as to be

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unaware of what happened to the reports of the pornography and student unrest commissions. He also advocates adapting the manmade environment "to the needs of living creatures, not the reverse." For Baron, human considerations should come before economic considerations. That's swell, but in the American system the buck comes first and curbing noise pollution is not going to be cheap (a sound-proof air compressor cost 25 per cent more than the standard one).

Even after six years in the struggle, however, Robert Alex Baron cannot be deterred. Citizens for a Quieter City, the anti-noise group that he helped found in New York City, has received a $300,000 grant from the Ford Foundation to help reduce noise pollution in a sixty-block area of that city.

I hope Mr. Baron and Associates come up with some answers, and fast.

Today, as I sit in my suburban office, I can stand the scream of jets landing at National Airport; I can handle the roar of buses and tractor-trailer trucks as they rev up their engines when the traffic light turns green on the street below; in the summer, I can even take the steady drone of the air conditioner located (in violation of the county building code, I might add) on the building next door.

But I'm not sure I'll be able to put up with the jack hammers, air compressors, and other equipment that I can expect when the subway construction comes to my area in a few years.

If I'm not deaf by then, it will be because of crusaders like Robert Alex Baron.

PERSPECTIVE

George Bernard Shaw entered a posh London restaurant, took a seat, and was confronted by the waiter. "While you are eating, sir, the orchestra will play anything you like. What would you like them to play?"

Shaw's reply? "Dominoes."

The Tyranny Of Noise

THE PRICE IN ENVIRONMENTAL QUALITY

By Robert Alex Baron
(A Selected Chapter)

Certain things creep up on man without his noticing them. Old age, deafness, the loss of his human rights, and the loss of the quality of life. If the war in Viet Nam stopped tomorrow, if enough housing was built, enough schools, if poverty and discrimination were ended – a noisy technology would still deny us the right to rest, the right to sleep, the right to be let alone. "Technology," says Wilbur H. Ferry, "touches the person and the common life more intimately and often than does any government. Technology's scope places in the hands of its administrators gigantic capabilities for arbitrary power."

Suddenly we see that, impersonal and blind, noise hits the sick and the well, the old and the young, the student and the vacationer, the hospital patient and the doctor, the factory worker and the farmer, the judge and the prisoner. Indeed, we are all prisoners of noise. A political dictator could not have more impact on how one lives than the operators of jets and jackhammers. Democracy gives man the right to vote, but not the right to sleep; the right to dissent, but not the right to minimize the noises of social utility; the right to go to school, but not the right to be able to hear the teacher. Under the guise of waging a necessary, therefore holy, war for progress, technology strips man of his dignity, his right to meditate and work creatively, his means of maintaining the well-being of his soul.

Morale is an intangible asset. What happens to the human spirit? When New York's new Metropolitan Transportation Authority announced plans for a Second Avenue Subway, the most typical attitude was that expressed by a middle-aged veteran of city life. Throwing up his hands in despair, he cried out, "I accept it. I live in New York, and I accept what happens."

But some New Yorkers have fought. They have picketed, petitioned, testified at hearings, tried the courts. All to no avail. The public is ignored into submission. The individual "may roar and yelp a bit," says Ferry, "and declare there ought to be a law. Then he subsides to a mutter and ultimately silence, which is precisely what the noisemakers count on."

Jean-Paul Sartre, in his play *No Exit,* described Hell as never to be let alone. The growing noise intrusion is creating this type of hell righ here on earth. Man has lost the right to be let alone. He must respond to the distractions of noises that are not even meant for his ears. Unable to shut them out, he is constantly at the mercy of the acoustic stimuli generated by others.

To Norman Cousins, "Silence is not nothingness or the absence of sound. It is a prime condition for human serenity and the natural environment of contemplation. A life without regular periods of silence is a life without essential nourishment for both the spirit and the functioning intelligence. Silence offers the vital element of privacy, without which an individual becomes something less than himself . . . . We live at a time when thought alone represents the difference between sanity and total madness. One of the prime requirements of such thought is privacy and a little silence, at least now and then."

Cousins was addressing himself to the readers of an intellectual magazine in 1962. Five years later, in 1967, *Life* Magazine, addressing itself to a much broader readership, showed the same concern for the destruction of solitude by noise. "The escalating noise problem," it editorialized, "may require the widespread rediscovery of the personal value of silence. Most religions throughout human history have insisted that man needs regular intervals of silence for spiritual health."

It erodes one's belief in human decency to observe what society does even to the sick.

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The telephone rang one sunny day in the CQC office. It was a member of our Board of Directors, the late Dr. William Vogt. His wife, I knew, was a cancer patient at Columbia Presbyterian Medical Center, one of the leading hospitals in the United States.

"My wife has been in a coma for two weeks; she is dying. There is a construction project outside her hospital room. The noise is dreadful. Ask someone to do something. Call the City!"

Call the City – ! He had forgotten that construction noise is the legal price of progress and that city noise must be endured in payment for the amenities of a civilized society.

But are the "amenities" of civilization, whatever those may be, worth the price in degradation? Our ancestors banded together to build walls to keep out marauders and Indian arrows. We modern are less successful with sound energy.

The failure of home design to insulate the noisy activities of the children is expecially distracting to parents who find it difficult to tune out their multiple sounds. The normal stresses of family life are aggravated by this noise. Husbands made irascible by their daily work, plus commuting noise, find it difficult to step into a noisy home with equanimity. Jansen's studies of German steel workers suggest that men who work in noisy jobs display a higher incidence of domestic difficulties than those who work in quieter jobs. From farmers riding noisy tractors to businessmen who end a day in a noisy office in a rattling bar car that far from tranquilizes the day's tensions, no one is immune.

Housewives are forced to bear the brunt of society's legalization of daytime open-air noises. A reader writes to *Good Housekeeping* Magazine: "I believe the constant din from our busy streets is literally making me ill. My husband says that's nonsense – that noise may make me deaf, but can't make me sick. Which of us is right?" The magazine answered: "You may well be."

If noise isn't making her sick, it may be undermining her marriage.

In contemporary homes, husband and wife are denied privacy for the intimacies of marriage. Dr. Haim G. Ginott, author of *Between Parent and Child,* describes our homes as "antisex." "Few modern houses or apartments," he writes, "have deliberate safeguards for sexual privacy .... It is a sad comment on our civilization that the sounds of legitimate love must be so low."

In today's architecture, no allowance is made for keeping outsiders from sharing the bedroom experience with the participants. Thin walls bring neighbors into the bedroom to cheer or jeer, as in the story of the man whose wife played hard to get. When she finally verbalized her assent, cries of "Congratulations, Hugo!" rang out, it is said, from the next *two* apartments.

Noise is the most personal and psychologically intimate of all the forms of pollution. It allows impersonal machines and other human beings to get unbearably close.

Writers of marriage manuals are starting to recognize the environmental imperatives. The authors of *Sexual Adventure in Marriage* offer advice on how "to circumvent noise, to create interludes of privacy for two that can refresh the senses and spirit." One suggestion for quiet surroundings for lovemaking: underwater. In scuba equipment?

Someday, noise is likely to be implicated as a factor in frigidity. Sudden noises will be discovered to short-ciruit the sexual response by shunting it to a secondary track while the body goes on to a state of alert. Couples experiencing difficulty in conceiving will be advised to wear earmuffs, or take to the water in snorkels.

Modern man no less than his primitive ancestors must depend upon his ears to warn him of danger. In 1930, New York City's Noise Commission reported that "There are many places where a tiger from Siberia or Bengal could roar or snarl without attracting the auditory attention of the passersby." In 1968, human tigers could murder in the city jungle and not be heard. On January 18 of that year, a middle-aged jeweler, held up in his shop in the heart of Times Square, was shot, not once, not twice, but four times without any of the scores of pedestrians hearing a sound. The shots were drowned out by the noise of compressed air hammers and other equipment at construction sites nearby. The two holdup men escaped.

When a 13-year-old New Jersey girl was found beaten and strangled to death 75 feet from the back door of a neighbor's home, the neighbor's son told reporters: "My father heard nothing. None of us heard anything. We had the air conditioning running all night." A quality environment should, at the very least, have noise levels low enough to permit shots and screams to be heard.

When you hear that helicopter noise is not different from any other city noise, think of the two people who were killed when Senator Robert

Kennedy's funeral train was passing through Elizabeth, New Jersey – killed because the noise from the low-flying Secret Service and news media helicopters masked out the warning horn blasts of the approaching train that hit them.

Someday, highway noise will be discovered to be a significant cause of traffic accidents.

Churches are no more a sanctuary from noise assault than the secular environment. Noise intrusion has no respect even for death. Mourners find that the sanctity of the graveside funeral service is violated by construction noise and lawn mowers.

The minister of one local church near a USAF base in England arranged for a "hot line" between the base and his church: a phone call silences the jets for weddings, funerals, and other special services. Churches near commercial airports are not as fortunate. They must either build soundproofed structures or endure interrupted services. In ruling against the Town of Hempstead's attempt to control jet noise over its land area, the courts acknowledged that church services were interrupted, but accepted this as the price of progress.

Perhaps the most dramatic example of how commerce and technology are defiling our environment is provided by the advent of the supersonic transport, the needle-nosed SST.

Fear of what the SST will do to man and his environment is being increasingly voiced by scientists and government officials alike. Don Dwiggins, for many years the aerospace editor of the Los Angeles *Mirror News,* in 1968 wrote a book, *The SST: Here It Comes, Ready Or Not.* At the end of this carefully documented work, he told his readers that he had discovered the villain of his story to be "the SST itself."

Why all the concern about this new type of plane, while the prosaic noises of surface transportation and even the subsonic jets have yet to arouse the public – or government – to effective action?

The reason is an eerie phenomenon spelled b-o-o-m, sonic boom – a physical reaction to the rupturing of the sound barrier as an airplane travels faster than sound. This boom is not something that happens only once, when the plane breaks the sound barrier. The sonic boom, somewhat like the wake of a ship, is a "sonic carpet" that accompanies the plane as long as it flies supersonically. As described by Dr. Bo Lundberg, a Swedish aviation authority the conical pressure wave becomes strong and hits the ground in every spot within a "boom carpet" which stretches miles wide continuously along the entire flight path. The typical boom is a shock wave, caused by the air compressed by supersonic flight. The wave of compressed air exerts physical pressure against whatever stands in its path.

We do not as yet know what the commercial sonic boom will be like. But we already know what booms from smaller supersonic planes will be like. We have a Canadian military pilot ot thank for giving us some inkling of what the boom can do to structures. Flying an F 104 supersonic jet fighter, he accidentally flew supersonically at an altitude of 500 feet. Nothing much might have happened had he been flying over the desert, but he was flying over the temporary control tower and the terminal building of the almost-completed Ottawa airport.

Don Dwiggins, in his book on the SST, summarized what happened to the structures:

> With a mighty concussion the control tower literally exploded, showering glass in all directions. The terminal roof was ripped open and aluminum flashing strips were thrown across the access road. A curtain wall over the ticket lobby was distorted. Large glass panes in the terminal were smashed. Four doorways suffered severe damage. Exterior stucco broke away, and crashed to the ground.
>
> Throughout the new building the ceiling was blown apart, the recessed fluorescent fixtures left skeweed, pushed up, or left hanging down, as if wrenched and tortured by a severe earthquake.

It cost the government of Ottawa $300,000 to repair the damage. The flight pattern, was, of course, against the rules.

It may be argued that this was an accident, but even in normal operation the sonic boom has a destructive effect on natural and man-made structures. In 1968, reports of damage to cliff dwellings in the National Parks System prompted the then-Secretary of the Interior Stewart Udall to imitiate his own study of the boom. Park engineers reported damage in Canyon de Chelly National Monument in northeastern Arizona and to geological formations in Bryce National Park in Utah, and potential damage to Mesa Verde National Park in Colorado. An estimated 80 tons of overhanging cliff fell on a cliff dwelling in Canyon de Muerto.

The Interior Department's 1968 sonic boom report (Udall) leaves little room for complacency. The scientists who wrote the report observed that unlike subsonic jets, which impact an area basically within a radius of 12 to 15 miles of airports, the SST, even if flown at high altitudes, creates new noise corridors on

the ground tens of miles wide along its flight path so that "... potentially no land area would be free from some noise intrusion."

Dr. Lundberg was the first to warn the world about he meaning of the sonic boom. He believes that "in the supersonic age it will be inadvisable to take a siesta, or leave a child in a pram, on a balcony, or beside a garden wall." Thanks to military supersonic flight, at least one French family didn't have to wait for the supersonic age of commmercial aviation. Here is the havoc as described by Walter Sullivan, Science editor of *The New York Times:* "Last week a French farm family, with eight neighbors and hired hands helping in the harvest, gathered for the noon meal in a farmhouse near the village of Mauran in Brittany. Suddenly, according to accounts from France, a sound like a thunderclap was heard. Timbers shook loose and eight tons of barley stored in a loft fell on those eating, killing three and injuring one seriously. Apparently it was the first time that a sonic boom had been blamed for fatal injuries."

Apparently these Bretons didn't know enough to adapt to one of the new "minor stresses" of modern living.

Understandably, then, there is a raging controversy over whether or not the SST should be permitted to fly at supersonic speeds over land. If such flights are permitted, according to the Udall study, sometime after 1975 between 20 million and 40 million Americans would be boomed five to fifty times a day under a path 12½ miles to either side of the flight paths. An additional 35 million to 65 million people within a path 12½ to 25 miles to either side of the flight path would be subjected to from one to fifty booms per day of somewhat lower intensity, and 13 million to 25 million more would experience one to four high-intensity booms. In short, up to 130 million American a day would be exposed daily to the boom.

"... There is considerable initial adaptation following several months of exposure, but even after several years of experiencing booms, most people find the booms objectionable or worse. Extensive research at Edwards Air Force Base, Oklahoma City, and in France, shows that even after some years of continued exposure to sonic booms, 30 per cent of the people exposed to booms at levels anticipated for the SST would find the booms to be 'intolerable' or 'unacceptable' and an additional 50 per cent would find them 'objectionable.'

"Persons experiencing sonic booms are startled and diverted or, if asleep, may be awakened in the same manner as those who hear an unexpected loud thunderclap or a large explosion. These effects may be accompanied by increased pulse rate and other minor and transient physicological changes, but they are not believed to be harmful in themselves, nor to endanger hearing."

It should be noted that in the body of this study it is admitted that "No tests on experimental animals or on human beings have been conducted over a sufficiently long period of time to detect possible chronic effects, or effects of long-repeated exposures to sonic booms... Tests conducted to date have not explored fully many of the situations in which sonic boom annoyance might be amplified. How extensive, for example, would be the interruption of cultural and artistic activities in which quiet and concentration are important? What is likely to be the impact upon infants, sleeping children, hospitalized persons or other individuals whose immediate well-being requires uninterrupted sleep or freedom from excessive noise? Studies to date have not considered these kinds of situations."

In his documented source book on the SST and the sonic boom, William A. Schurcliff, Ph.D., Director of the Citizens League Against the Sonic Boom, provides further information on why the sonic boom is a new noise, to be taken seriously:

"The boom is annoying because it is so loud, so sudden, and occurs with no warning whatsoever. It sounds much like the "bang" produced by a moderate-size explosion a block away. Because it strikes with no warning (and no visible explanation), the boom evokes man's primitive startle reaction... The Surgeon making a delicate incision will jump too."

This source book further describes the adverse effect on noise on sleep. During the Oklahoma City sonic boom tests (sponsored by NASA and the FAA), "18 per cent of the persons polled complained of sleep-interference by the boom – even though the booms did not start each day until 7:00 A.M., and even though the average overpressure of the booms was only 60 per cent of the overpressure expected of [commercial] SSTs' booms. Many persons used the 7:00 A.M. boom as an 'alarm clock' – and did not 'get used to it'."

Hidden in the government reports of sonic boom tests is the word "average." The reference is to the average boom pressure. The incidents reported above were presumably caused by the *average* type of sonic boom. But Dr. Lundberg has called attention to the "superbang," a sonic boom that exceeds the average pressure by a multiple of two or more. In the tests conducted at Oklahoma City, Lundberg observed that "at every point within the whole carpet, one boom

strike in a thousand is twice as strong or more than the average on the track." Many factors contribute to the formation of a superbang: atomospheric conditions such as temperature changes, winds, local turbulence, cloud formations, flight operations such as turns and accelerations. It does not look as if local or even Federal laws will stop these.

Though only one boom in 10,000 is likely to be a superbang, they will be frequent occurrences because of the millions of people and structures that will be struck in the boom carpet. Lundberg believes that conservatively speaking. 10 million people could be exposed to superbooms in the boom carpet of the New York-to-Los Angeles run. He further believes that this enormous mass of severe boom strikes will inevitably result in many serious accidents, for example by falling glass, or even deaths, by heart failure.

If overland flights are banned and supersonic speed permitted only over water, how easy will it be for commercial fishermen, and steamship passengers and crew, to settle their claims for sonic boom damage?

How effective will protest be, even if 50 million are boomed? Only a small minority will know how to or be prompted to protest. Also, it will be much simpler to repatch the plaster than to go through the red tape of processing a complaint against the government.

Replying to those who say we must accept the sonic boom as another noise strees, Lundberg says it is illogical and cynical to ask us to accept the sonic boom just because we suffer from jet, traffic, and other noises. "The very that local noise is unavoidable these days, makes it, of course, all the more important that the countryside and quiet suburbs are kept undisturbed. Only then will it remain possible for those who are noise ridden during part of the day to recover in the evenings and nights and during weekends, holidays, and sickness."

Meanwhile the international race to introdce the SST continues.

Less dramatic than the sonic boom, but no less disturbing, is the effect of noise on personal communication. Very rarely these days can we hear the sound of the human voice as a solo. Even in the theater we must listen to the actors' voices plus the sounds of the ventilating or air conditioning system.

Mechanical noises also pollute the atmosphere of concerts, outdoors as well as indoors. Noise won over music when the New York City Parks Department opened its outdoor stage at Damrosch Park. The music critic of *The New York Times* accepted seven jets, one four-engine prop plane, and one helicopter, all in the first fifteen minutes of the concert, as "par for an outdoor concert in the city." But he could not accept the concerto for air conditioning system which played the entire concert from the bowels of the adjacent Metropolitan Opera House, a concerto which "roars like a sizeable waterfall and never stops." Not even the amplifying system could overcome these external noises.

Kindergarten children attending a school near New York's Central Park were taken for a walk and then asked to list the outdoor sounds they had hear. The majority of the sounds they names were noises, mostly from transportation. There were few mentions of quiet sounds like birds and human voices. Transportation nosies are becoming more "natural" to these youngsters than the sounds of nature.

Will society have to develop special soundproofed "museums" where people can go to hear the pure sounds of music, the spoken word, and nature?

To fully enjoy music and hear it as the composer intended, it is essential to hear the high frequencies. It is true, observes Yeshiva University music proffessor Dr. Edward Levy, that the fundamental tone is below 2,000 cps, but, if the ear loses its potential acuity, it loses the ability to distinguish timbre, or tone color. Berlioz, Brahms, Debussy, Berg, and many others carefully took advantage of the differences in timbre among various instruments. As for contemporary composers and their new electronic material, most of it is in the higher frequencies. Those with hearing loss, Dr. Levy believes, will lose contact with this new music. Of course, one may not choose ever to listen to it all, but it's nice to know one could.

The partial loss of hearing is somewhat analogous to faulty vision. Sounds are blurred, sounds are dimmed, and some sounds are not heard at all.

The transition from mild hearing loss, if we can call the loss of full-frequency hearing mild, to total deafness is like going from a sentence of probation to a lifetime sentence of solitary confinement. One hearing specialist describes the gradual loss of hearing thusly: "The humming, buzzing, rattling sounds of everyday life slip away. Friends' and relatives' diction becomes increasingly sloppy." The person who becomes deaf or "hard of hearing" lives in a world of subdued sound, or even silence. He has lost his primary means of communication and tends to withdraw from the world and live within himself, a comparative recluse.

Deafness, it is said, is more of an isolation from humankind than blindness. Deaf people, it is said, seldom smile. Unverified reports claim a greater tendency to suicide among those who become deaf than among those who go blind. Helen Keller has been quoted as saying that the world's "normal" people have never been roused to mass sympathy for the affliction. "It causes no fever, no crutches, no seeing-eye dog, not even a sneeze," she told interviewer Phyllis Battelle.

Earlier Miss Keller and written: "Deafness, like poverty, stunts and deadens it victims."

Even total deafness offers no escape from traffic and aviation noise, which have much of their energy in the lower frequencies. City planner Clifford R. Bragdon has reported that a totally deaf man living near Philadelphia's airport conveyed to him that he was constantly awakened by vibrations from low-flying aircraft.

Hearing aids are no panacea. For one thing, they are not always helpful for deafness attributable to noise. For another, their use can exaggerate the impact of sudden noises.

From an article in *Today's Health* comes this information: "Another problem of hearing aid users: sudden loud sounds. The roar of a jet, the scream of a police siren – these can be extremely painful." The article indicates one possible solution, an automatic gain control that cuts out when the sudden sound signal is intense, and comes on again when the noise diminishes.

Note that the hearing aid user is twice a victim – when he suffers his hearing loss, and when he discovers that the device he must use to compensate for that loss in itself adds to his discomfort and alienation from his fellow man.

For the deaf aged, aural separation from the world of wanted sounds adds to loneliness, itself one of the most painful afflictions of old age. Thus in what should be their golden years, our senior citizens must lose their ability to hear the comforting sounds of their loved ones, and must be cut off from the warming, stimulating sounds of music, nature, and so forth. I don't know why I say "our senior citizens," as if most of us were not destined to become senior citizens.

The brutalization of our society by noise is revealed by what we are doing to our children, exposing them to such excessive noise in their formative years that they tune out in self-defense and have to be educated to listen to verbal communication, The Mabaan children are taught to listen for self-protection. Educators have told me it is a commonplace in a city like New York that new pupils coming from low-income areas also have to be trained to listen. At home, amid probably many brothers and sisters demanding attention against the external noises of raucous street activities and heavy traffic, the children have heard speech chiefly as grunts, and had to pick even those out from among many other generalized human sounds. Apparently, in the act of screening out the destructive sounds of their environment, they have lost the art of focussing on speech sounds.

Pre-talking-age children who constantly hear noise-masked speech do not receive the full auditory value of the speech sounds in their surroundings. Consonants and vocal nuances are masked, filtered out, and the child learns an imperfect vocal pattern.

Tune-outs, especially among the underprivileged, growing up in noisy environments, may later become drop-outs.

But noise is becoming an economic equalizer, and all children are beginning to suffer. Well-to-do mothers seek apartments that face away from traffic, and they man the picket lines to oppose heliports and jetports.

As if to assure ourselves that our children will be prepared for tomorrow's noise-saturated world, we allow excessive noise to accompany them during their school hours. Most schools seem designed to be reverberation boxes. Hard floors and ceilings amplify the normal sounds of school activities. The students are sitting ducks for decibels. This is what one small-town Texas high school environment sounded like to a college professor of Health and Physical Education:

"In a single wing of the building, a half dozen classrooms are hammered with afternoon noises – Vocational Education classes. The efficiency and effectiveness of the lecture classes drop and the students strain to hear. Fatigue and irritability of students and teachers is great."

What happens to the quality of education when teachers are exposed to fatigue and irritation from noise? "I have found the noise to be an abomination," wrote one private-school teacher. "In the classroom, concentration is difficult and I have to raise my voice to be heard. I must choose between opening the window and not being heard or leaving the window closed and subjecting my pupils to stuffiness and sleepiness. After classes there is no relief. I live here at the school and cannot escape the noise [of construction going on in the vicinity] to relax after a

trying day of teaching. Over a period of time, this has seriously interfered with my work, as my enthusiasm and effectiveness in the classroom is directly dependent upon complete relaxation during free hours."

Too many schools have been built near jetports, or vice versa, and aviation noise is lessening the efficiency of the educational process. So frequent are interruptions from aviation, they are now clocked and inserted into the *Congressional Record.* The Superintendent of Schools of Inglewood, California, told a Congressional subcommittee:

"As for our instructional program, we must point out that oral communication becomes impossible each time a jet aircraft passes near our schools. This means that approximately 165 teachers and 4,000 students must stop all class discussion until athe aircraft has progressed beyond the schools. The result of such disruption goes beyond the actual time involved in the passage of the aircraft and each class must again have its attention focussed on what was being done before the interruption.

. . . Our teachers tell us that as the number of jet planes increases they find classroom instruction increasingly difficult and it is their feeling that considerable loss in the educational program results."

Some school architects are now eliminating windows or planning underground classrooms.

Handicapped children suffer most. The impact of sudden nosies on children with epilepsy and other diseases forces parents to seek forms of escape. One mother wrote me to inquire after a source for the acoustic earmuffs she had seen me demonstrate on television. "My son is extremely sensitive to loud noises, both sharp and sudden. . . . There are many activities he would like to participate in – but due to this problem he cannot do so at this time. He seems to tolerate moderate noises but anything above a normal high or sharp tone disturbs him. He is a cerebral palsy boy with tension, and has a severe problem with loud and sharp noises."

By giving moral and legal sanction to noisemaking, we have made outcasts of those who suffer from noise They are made to be ashamed of their suffering, as if it indicated some flaw in their character, a desire to stop civilization's progress. They feel constrained not to convey to their family or friends how they feel. Many choose to suffer silently, rather than chance ridicule.

Among the hundreds of letters CQC received after my appearance on the Johnny Carson *Tonight* Show was one from an elderly woman who found relief in writing to an organization that understood what she was going through. All her life, she wrote, she not only suffered from noise, but had to hold back her complaints.

CQC's first office was a sublet in the Theatre Guild building. A public relations man wandered into the place one day by accident. Instead of excusing himself and departing, his eyes fastened on our name plate. Cool and poised, this Madison Avenue huckster started asking questions about our operation. Suddenly he plunged from his poised demeanor into an agonizing description of his own noise problem.

"They've just opened up the second bar within earshot of my apartment. These two spots have become the 'in' spots with the sports car crowd. I can't sleep. And now the building across the street has just installed a giant air conditioning unit on the roof opposite my window. That constant roaring is driving me bugs – " And then he stopped as suddenly as he had started, visibly embarrassed. "My God, I'm not a complainer. I didn't mean to complain. I must sound like a kook."

Torture is defined as something that causes agony or pain, suffering, annoyance. These are the very terms the public and our social commentators use to describe what noise is doing to us.

Noise exposure and its effects are not unlike the non-violent techniques used to torture captives since time immemorial. Dr. Zhivko D. Angelusheff, a staff member of the Speech and Hearing Center of New York's City Hospital, cities a third-century B.C. Chinese suggestion that instead of hanging criminals, "flutes, drums, and chimes or bells should be sounded without letup, until they drop dead, because this is the most agonizing death man could ever think of. . . . Ring, ring the bells without interruption until the criminals first turn insane then die."

As man advanced up the rungs of the ladder of civilization he improved his methods of applying noise torture, and expanded their practice. The Nazis used the whine of Stuka dive bombers to terrorize civilian populations; when all else failed, they broke the will of concentration camp prisoners with an unbearable noise.

Dictatorships seem not to be able to forego noise torture. A young Greek told a news conference that he had seen a man accused of being a Communist, but who maintained his innocence, tortured for three months by excessive pressure on his extremities, and by intolerable reverberations from a bell outside his cell. The Russian Communists in turn expose their political prisoners to a novel form of modern noise

torture, nothing as primitive as beating bells, or gongs. They simply place them in a noisy factory in a Siberian labor camp.

The Russian writer Anatoly T. Marchenko, himself a prisoner, told *The New York Times* what happened when another writer, Yuli M. Daniel, was transferred to a machine shop: "The noise in the machine shop was loud enough to split the head of even the least sensitive of men. Daniel suffered from ear trouble, and the prison staff knew this. The result was that Daniel, who was only slightly hard of hearing when he came into the camp, is now almost deaf."

In the Unites States and all of the industrialized countries of the world we expose men to the same conditions as the price of earning a living. What kind of a society is it that allows men to work under conditions which in a Soviet prison camp are punishment?

The classical use of torture was for a purpose: to demoralize, to force a confession. The horror of today's torture by noise is that it is inflicted on a hapless civilian population without purpose. The consumer is not the enemy of commerce and industry; why is he treated as such?

Constant, nagging noise brings out the worst in man. One of the reasons John Connell formed the British Noise Abatement Society was his discovery of "the deep widespread feelings of hatred generated in the minds of captive audiences forced to listen." Noise is seized upon as a rationale for deep-rooted prejudice, and all too frequently complaints of neighbor noise describe the offending party by ethnic background, as in: "I live in a city project, next door to nine Puerto Ricans, seven teen-agers. . . a loud juke-box is played all day and most of the night. There is nothing but a drunken cabaret of gaiety going on all day and most of the night. . . . The architects who designed these projects ought to be forced to live in them."

Mayor Lindsay failed to understand the influence of noise on social relationships when he ordered an investigation of hippie riots in Tompkins Square Park. He wanted a report on why a riot should erupt out of a group engaged in what he saw as "noisy but generally harmless activity." The bongos and Buddhist love chants were not deemed a harmless activity by the old-timers living in the area. Two youths and eleven policemen were injured and 38 persons were arrested because, among other things, preexisting tensions between the resident Puerto Ricans and Slavs were aggravated by an alien noise. One minister described the differing social and cultural values as creating a "power keg." An intellectual living in the area told a reporter that the Poles, Czechs, Ruthenians, and Ukranians are a stolid type who go in for law and order in a big way, and hate the disorder of the hippies and their noise.

Fury is also generated by the legalized nuisances of society. One woman who was experiencing nightime railroad track repair in front of her apartment on the fringes of New York's East Harlem wrote:

"I am not a violent person and have never had and do not expect to ever have anything to do with the riots in our cities. But having lived on the fringe of East Harlem for 1-1½ years I am in a position to begin to understand riots and the reasons for them, and even to sympathize with them. . . . If I were a Negro and had I lived in Harlem always I might be more violent than they have been or ever shall be . . . . Residents have been forced to endure the penetrating noise . . . and to rise or stay up all night because the noise is so intense. "If the New York Central Railroad could be bombed with fire bombs or dynamite, or a fire started, without any loss of life, and if I were a native of Harlem, I might turn my lack of cooperation by the authorities into destructive retaliation . . . . At times one has to take things into his own hands, when he has had enough, and has exhausted other means, and use whatever means is available to him."

Someday, we shall be able to count the dollar cost of noise, and diagnose its price in physical health. But, in trying to assay a direct dollar cost, we must not lose sight of the fact that this life on earth is a limited one. Noise, no matter how one interprets its impact, does "cost" man a portion of his human existence. I am haunted by the phrase environmentalist Ron Linton used before a meeting of the American Public Health Association: "What is the cost of living day?"

PERSPECTIVE

For where I dwell
Where I put
My foot
My mind
My soul
After each day's
Victory
Or defeat –
Where I dwell
Becomes
The epitome
Of a little bit
Of Heaven
Or a large part
Of Hell.

– Anon

A Habitable Urban Habitat

BEYOND HABITAT

By Moshe Safdie

Edited by John Kettle

Reviewed by Wolf Von Eckardt

The reviewer is architecture critic and a member of the editorial page staff of The Washington Post.

Pompous asses and silly bureaucrats keep crossing up Moshe Safdie with their pusillanimity and utter noncomprehension. But beyond Habitat '67, which he designed for the world's fair at Montreal, he has exciting ideas to make our messed-up urban habitat more habitable.

What makes his ideas so convincing is that he writes about them – and the pompous asses as well – in a cheerful, simple, unpretentious way, always sticking to specifics and his own direct experience. This first-person-singular modesty tells us more about the great frustrations and the great potentials of our cities than all the learned urbanologists and technocratic prophets. And it makes better reading.

What is more, anyone who feels, as I sometimes do, that the world is going to hell and the young, though they keep reminding us of our failures, won't be able to come up with any constructive solutions either, will be much encouraged by Safdie's book.

He was 22 years old when he conceived Habitat and not yet 26 when – against much opposition and intrigue – he persuaded the Canadian authorities to build at least part of it. He is one of the new people. At 32, he shares the new consciousness – the awareness that we can't go on making war on nature (including our own), and that considers 100-story Hancock buildings or World Trade Centers as destructive, I should think, as Pentagon defoliation forays.

Having come from Israel, where he was born in 1938, to Canada, where he studied architecture at McGill, Safdie made a study tour of the U.S. He saw children clinging to the wiremesh balcony railing on the 17th floor of the highrise housing and he saw the jammed commuter freeways to suburbia with all their fearful waste and alienation.

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These grim alternatives prompted him to abandon his plan to design a parliament building for Jerusalem as his graduation thesis and to search for a better solution to resolve the conflict between the need for density and the desire for privacy.

At Habitat you live in your own house and the kids can play in the backyard which is on the roof of the house below. Yet you live right in the city and can walk to work and a movie. Habitat has a density 10 times that of Westmount, a typical suburb. If the Canadians could have found the money to build Safdie's entire community of 1,000 houses (instead of only 159), there would have been a school and a shopping center tucked under the pyramidal structure. And the cost per unit would obviously have been considerably lower.

But here we get into one of those viciously mad circles: To bring the cost down you have to build a full-fledged Habitat, but a full-fledged Habitat cannot be built before the cost is down. For the $5 billion we expect to spend on the SST, says Safdie, we could build a Habitat in every state and province on this continent.

Safdie names all the Robert C. Weavers and Thomas Applebys in our government who toyed with him and his idea but soon, weasling on contracts and promises, boxed him in with the same old, stupid codes, inflexible cost ceilings and obsolete guidelines and then pronounced a Habitat on Washington's Fort Lincoln site "not feasible." In the end Safdie only asked that the Redevelopment Land Agency state truthfully that this cost feasibility was a relative matter. Appleby never answered the letter.

The establishment shenanigans are even less excusable at Safdie's student union project for the University of California San Francisco campus. He worked hard with the students to meet their idea for a new kind of environment. In the end the students got what they wanted and were ready to pay for with

their own money. The faculty, the university president and local architects approved with enthusiasm. Gov. Reagan's Board of Trustees arbitrarily nixed the building and impounded the students' money.

Another Safdie project was vetoed largely because Gordon Bunshaft of Skidmore, Owings and Merrill seems to think that if people lived in Lower Manhattan, mothers with their baby carriages might spoil the serenity of his proposed Stock Exchange Plaza. And so it goes.

But Safdie is not angry. I am.

Safdie is much too busy building a Habitat in Puerto Rico (which is at last literally off the ground), planning new cities for Israel, working out a basic new urban transportation system and, in several other ways, trying to make technology serve a more human environment.

Industrial standardization, he found, can lead to more variety, not less. He states at the end of his fascinating book:

"In Habitat there is the seed that will eventually grow to the point where the individual has much greater ability to shape and change his living space so as to produce something that corresponds much more closely to his feelings of what his whole environment should be."

I am sure he is right. And that Habitat in the end will be considered a far more significant step for mankind than a noisy airplane that gets a few businessmen to Paris an hour faster.

INTRODUCTION

from BEYOND HABITAT
By Moshe Safdie, Edited by John Kettle

I had never lived in a house before. Habitat was the first.

It was what I always imagined living in a house could be, and yet it wasn't a house as we know it. There were things happening around us all the time. We lived in a way we could have lived only in a big house in a fancy suburb; and yet we did things we could have done only in an apartment on, say, Sherbrooke Street in downtown Montreal, or Fifth Avenue in New York. We had both.

The wonderful thing about living in Habitat during Expo 67 was that it was exactly the way I envisaged it to be – a community, almost rural in nature, *in the city*. People were around you in great numbers; not only those who lived there, but all those who were visiting Expo. There were shops, and there were movie theaters, and there were exhibits and parks and fountains, and there were ships docked in front with people coming to visit the city, and there were all the elements that make a good city.

And yet with all those millions of people, when you closed the door, you were in your own house. You had privacy; you really were alone. You looked out at the view and you were not aware of the crowds of people surrounding you even though they were there by the millions. You had a feeling of seclusion, of quiet. Never in all the months I lived there did I hear a neighbor through the walls or the floors. We would wake up on the morning and open the sliding doors and we would have breakfast in the garden. Our children would open the front door, get on their tricycles and ride down the pedestrian street to the playground, meet other kids and become friends with them, continue playing half the day there and throughout the structure outside our house. We had a dog and we could take him for a long walk right outside our door.

These things, I suppose, would have been possible if we had been living on a quiet residential street in a suburb such as Westmount, with our own house and garden. We could have gone out and had breakfast in the garden and so on.

There was nothing unique about it except that we happened to be on *the tenth floor, in an environment that had ten times the density of Westmount.*

But in Westmount, if you wanted to go and see a film or go to a library, or even if you wanted to go to work, you would either have to get in your car or get on a bus or subway. In Habitat during Expo you went down ten floors and you were together with fifty thousand people. You could see the best movies, go on to a visiting ship docked close to the building and join the party, eat in any of dozens of good restaurants.

That mixture of being in the busiest, most crowded urban meeting place and, at the same time, a hundred feet away, going through a door and being alone in your house, was an incredible experience. This sense of seclusion was achieved by the fact that the houses were free in space: they all opened in three or four directions. From some windows you saw the city, from others the river or Expo. You had morning sun in some rooms, sun in the evening on other rooms, and you felt the sun going round you all day.

Everything about it gave me the feeling of *house* and yet it gave me all the other things I had always wanted in a house but never found in the isolation of the anonymous suburb.

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EPILOGUE: A MAGIC MACHINE

Back in 1960 I was wondering what to call my thesis. I finally gave it the title, "A Three-Dimensional Modular Building System". That proved to be an important decision. I didn't think of it as a building. By talking of building systems I implied a departure from the concept of "The Building" as I understood it as a student.

I think it is important to keep emphasizing that there are two issues, not just one: the technical problem and the environmental problem. My intention at Habitat was to organize the building into small repetitive components that lent themselves to industrialization and then to unite them by a formal language of permutations and combinations, rhythms and variations, that would provide the sense of place people need and allow them to retain and develop their sense of identity.

I would say again, that ideally each house should be different from every other house, as each person is different from every other person, and that communities should differ from each other as much as their inhabitants do. The Habitat space cell was only a crude start on the development of this ideal.

Then there is another scale of variations, what the individual can handle once he gets a house: Can he move the walls? Can he change the floor? Can he adapt the space to put books where he wants them? Can he, in short, adapt the house to his habits? The problem is to build adaptability into a house that is mass-produced out of modular components and has standard plumbing and electrical circuits and standard structural components.

Now those people living in Habitat are, to put it simply, happy. But at another level, I feel a shortcoming of Habitat is that even though there are twenty house-types with a variety of internal arrangements the spatial characteristics of the box are so strong that they feel very similar. I have subsequently explored the possibility of greater variation. I designed a system that was basically a cube measuring twenty-one feet on each side, subdivided into nine cubes each measuring seven feet on each side, and assumed that it would be technically possible for the tenant to place walls, floors and ceilings on any grid line in the box. He could have a three-storey house with seven-foot ceilings or a one-storey house with a twenty-one-foot ceiling, he could have the walls anywhere he wanted, he could rearrange it at any time. There are several million different permutations possible with this system – and yet with all that variety there is no real mathematical differentiation. Each permutation feels the same. All those variations are essentially rectangular and are dominated by the specific rectangular nature of the space matrix. There is a difference between variety in the mathematical sense and variety in the psychic sense.

I set out on another exercise, coming at the problem from the other end. Could you design a system made up of a five or six component assembly that combines its elements to form different houses whose spatial characteristics will be so varied that the man who lives in one will feel that it is totally different from his neighbor's, so different that he will consider it as different in nature, of a different geometric order? I developed a system based on a cube and five additional components, a semi-circle, a hemisphere, a prism, a semi-prism, and a half cube, and put them together, each of the sub-components attaching to the cube. It was obvious that a whole family of different forms could be generated out of this simple repetitive system. If one took that a step further and said that the tenant could change or rearrange these sub-components at any time then it was theoretically possible to devise a system of infinite possibilities. And that means that you can have mass production, you can have repetition, and still you can give the individual great control over his own environment.

Working on the San Francisco Students' Union I became aware of the other dimension of the word *system.* Here was a building with many complex spaces of different sizes and different requirements and nevertheless you could find some common denominator which I called "space-maker." It wasn't just technology that made me want to find a common denominator. It was that the space-maker could be put

together by the students and the building they would make, while not exactly the same as mine, would have been the same environment. The problem was generalized. I did not permit it to be specific, I tried to find the essence of the general, a common denominator that I later came to realize had the generic essence. I could let this space-maker loose and it could design itself according to the laws or rules I had given it, its own laws of arrangement. If the space-maker is a musical note, then the building system is a repetitive theme and the building is a fugue.

The San Francisco Union was not a composed building in the traditional sense. There was a form-making process in establishing the system and then there was another process in putting it together, but at no time did I compose in the sense that I thought it would look better this way or that way, at no time did I draw an elevation and think what proportion would look nice. This is also true of Habitat. I didn't design the space under the houses in the plaza. No one could compose such a complex space. It would be like trying to compose the kind of environment you experience when you're under a tree in sunlight. The branches and leaves come together in certain ways, the sun shines through morning clouds, the tree moves in the wind, the result is unique at each moment.

I can illustrate this point by comparing it to a building I love – Le Corbusier's courthouse in Chandigarh. It has the soul of a courthouse, it is shaped by the movement of people and it has a sense of place. But it is a composed building, a finite solution to a specific problem at one given point in time. Le Corbusier fixed it as a specific structure – the proportions, the grille, the patterns, the ramps – composing it step by step from its various elements. You could not change the building, you could not add to it. Only Le Corbusier could put it down, only he could modify it to make another courthouse.

The courthouse is an individual specific building. It's fixed, finite. In San Francisco, while I was trying to capture and understand the spirit of a students' union and give it physical form, I tried to arrive at it by breaking it down, going a step further back. The students' union has offices, dining halls, libraries, and so on, but in that respect the courthouse is exactly the same. It has offices for clerks, waiting rooms, courtrooms, laboratories. There's a difference in the spirit of students' social gatherings and of a place of law, but not in their basic natures, both of which the system must acknowledge. Instead of finite solutions we must try to find the genetic code of a particular environment. The genetic code produces an infinite number of adaptations, each in itself not finite – not buildings with beginnings and ends, but continuums capable of growth and change.

This is exactly what happened in the vernacular village. There is a certain similarity between the San Francisco union building and the village that a group of peasants building their houses with an evolved formal vocabulary might create. That's where I feel my work is vernacular and not an extension of the Renaissance tradition in architecture. It's not a solution for all things. In each case I search for a solution that is organically valid for that particular problem. It's very specific, in fact. If I were given the problem of designing a city for Frobisher Bay, I would evolve a system solution that was specific to the spirit of Frobisher Bay, the cold north, a very specific problem. I am quite sure that I would draw on the geometric experience of my previous work, just as I am able to find common geometric experiences between a housing problem in Puerto Rico and a social building in San Francisco. But each particular problem generates a particular adaptation.

Trying to find an architectural DNA molecule – or, as a friend suggested, abandoning the *act of creation* and seeking to make the *means of creating* – is an ambitious act. But, I am sure that if solutions are worked out by architects in this way, if each is true to the laws of human nature and environment, the results must have unity. This is where my hope lies for a true contemporary vernacular, which is the diametric opposite of a world where style and fashion are the dictating motivations. That is so arbitrary, so irrational, that no vernacular can result from it, only chaos.

Each architect would use, adapt, and add to the totality of environment. I have faith that, thus, many men's efforts and colutions could fit into the macro-matrix of the whole environment in harmony. Each is governed by enough of the same laws of nature and of the physical environment of man that they should have unity. No man's expression can supersede the laws of human nature and environment.

Our problem is always to combine order and freedom: freedom without chaos and order without sterility. Heretofore we have thought of building in terms of the technology of today – the stamping machine, repetition. But the technology of building will become all-capable, like a computer punch card with millions of possibilities extended in four dimensions or fluids capable of limitless forming.

Ultimately, I would like to design a magic housing machine to do just that. Conceive of a huge pipe behind which is a reservoir of magic plastic. A range of air-pressure nozzles around the opening, control this material as it is forced through the edges of the pipe. By varying the air pressure at each nozzle one could theoretically extrude any conceivable shape, complex free forms, mathematically non-defined forms. People could go and push the buttons to design their own dwellings. One restriction built into the machine would be that it would have to make sure that all its extrusions interlocked to form one building by insuring that all designs included certain fixed points of contact.

This is a very exciting idea, indeed, because it suggests that in the ultimate evolution of technology in the building process, we may find that the highest form of organization means the least standardization, that technology can make industry as flexible as nature.

I haven't yet been able to translate this into a buildable solution any more than I have technically solved the six-component assembly. But I am convinced that in Habitat there is the seed that will eventually grow to the point where the individual has much greater ability to shape and change his living space so as to produce something that corresponds much more closely to his feelings of what his whole environment should be. And that is the idea of the vernacular, which is made by men for themselves – and the architect is their instrument.

PERSPECTIVE

"No person who is not a great sculptor or painter can be an architect. If he is not a sculptor or painter, he can only be a builder.

– John Ruskin
1819-1900

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THE FUTURE OF AMERICAN CITIES: TWO VIEWS

VIEW I: Let's Build Cities Way Out Yonder

By Frank L. Hope, Jr.

The writer is president of Frank L. Hope and Associates, a San Diego architectural and planning firm, and is president-elect of the California Council of the American Institute of Architects.

With a great deal less than the resources used to put two men on the moon, our nation could create a metropolis, or perhaps two or three, such as no one could even have dreamed of until very recently. Within the space we still have in this country, we could select climates and landscapes to suit our needs.

Our population is growing at the rate of 2.6 million a year. We are not creating "new towns" to wedge in the cracks between existing cities. They will provide shelter but never the stimulation, the excitement or the freedom of choice that a true city can give.

Our spiraling population deserves an environment in which people can create, where they can grow mentally and culturally, where they can, by their interaction, create a sense of destiny. When a significant proportion of the residents of an urban area must travel an hour to enjoy a symphony, to reach their recreation areas, see a ball game or go to work, the limit has been exceeded.

'New Towns' Not Enough

Building "new towns" of 20,000 or 50,000 people, or even 100,000, in the shadows of existing metropolises, is necessary, I am sure. They will provide pleasant middle class living – but at the expense of existing urban centers.

Some of President Nixon's advisers have recommended that we build up to 10 new communities a year, in the 75,000 to 100,000 population range. This is an incredible task and if these new cities are placed near existing urban centers they will only add to the crushing burdens of supporting public services and utilities that already exist.

But if these cities are off by themselves, self-sustaining, they would not be large enough. A town too small for major cultural, sporting and recreational facilities or a sufficient variety of economic and employment opportunities may have its delights, but it is not a true city.

A true city requires a critical mass of people. This mass must be able to attract and support the arts and the sports. It must be able to supply the activities, economic and otherwise, to offer challenge and opportunity to its young men and women. Such a city should be large enough to absorb a year's growth of the national population, not much less than 2.6 million. It is on such a scale that a city for the 21st century – less than 30 years away – should be conceived.

Until our own time, the opportunity to build such a city did not exist. In the past, cities were dependent on locations with natural or military advantages. They require access to the sea, to rivers or to raw materials. Now, modern transportation has reduced the economic penalty of distance, and technology has reduced our dependence on natural resources. Moreover, the United States has largely become a service economy, only a minority of whose workers are engaged in turning raw materials into goods.

Enterprise today looks to the availability of skill and talent as the critical elements to be drawn from an environment. These are elements which can be nurtured by the quality of the environment itself.

There are dozens of sites that would serve for Earth City in the spacious interior of our continent: the plains of eastern Oregon; the highlands of northern New Mexico, near magnificent mountain ranges; the rolling green country of central Wisconsin; perhaps a new Phoenix, rising in the high desert of central Nevada.

Building Earth City would require an effort less in order of magnitude than reaching the moon, but the operation would be as complex. It would require a national commitment of billions of dollars and a gigantic commitment of public interest and support not measurable in dollars. I believe the money and the commitment would be returned many fold, as Earth City came "on line" and shouldered its share of our growth responsibilities.

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Perhaps a non-profit corporation formed by government, industry, labor unions, universities and other institutions of vision would constitute the most likely entrepreneur for such a project. This corporation would be formed with a limited lifespan, contrived to pass on its assets and its authority to the public when the city has grown to maturity.

The cost of Earth City must be compared with the cost of alternate solutions – such as the creation of an East Coast, West Coast and central megalopolis with any reasonable degree of life quality, or the restructuring of our existing metropolitan areas for extensive growth.

The growth of Earth City could not be left to chance. An economic base would have to be assured by both government and industry. The government could favor industries which locate in the city with contracts and subsidize links with the nation's rail and air networks.

Planning Earth City would have to be designed for what we know of 21st century man. We might, for instance, realistically imagine that the American of 2050 will have more mechanical energy under his control, have more liesure and be just as insistent as we are on having his independent means of transportation. It has not been sufficiently recognized that we are becoming a nation of mechanical slave owners and, as a consequence, may well be evolving as the first mass aristocracy of history. Such an aristocracy will be more critical in its taste and less devoted to practical affairs than we are today if we may judge by the behavior of past aristocracies.

Inevitably, this proposal will be called impractical or utopian by skeptics. Yet I believe it to be one of the most practical solutions to the current and future problems of our expanding population. Earth City is not an ideal scheme for an ideal society; it offers only a framework in which a democratic community can grow.

VIEW II: Let's Make More Habitable the Cities We Have

By Wolf Von Eckardt
Washington Post Architectural Critic

What architect Frank L. Hope Jr. calls "Earth City" I would call "Cop-out City." His proposal only evades the task of cleaning up the mess we have made of urban America by messing up "the plains of eastern Oregon, the highlands of northern New Mexico and the rolling green country of central Wisconsin" as well.

The idea of building huge instant cities in the wilderness has become quite fashionable lately. People are fascinated by artist-architect Paolo Soleri's "arcologies," for instance. Shown in various museums, these fantastic sculptures depict modern Towers of Babel, three miles high, where three million people are to live with a view of an unpolluted ecology.

Buckminister Fuller, along with a number of other distinguished people, is working on plans for an experimental city in Minnesota that is dear to former Vice President Hubert H. Humphrey's heart. But the Vice President, Spiro T. Agnew, also welcomes such an "engagement with the future," or so he says in his introduction to "The New City," the report of the National Committee on Urban Growth Policy. This committee of very respectable politicians, including governors, senators, congressmen and mayors, recommends "the creation of 100 new communities averaging 100,000 population each and 10 communities of at least one million population."

The rubbery work "community" fails to make an important distinction which Hope makes when he advocates 'new cities" but disparges "new towns." The terms have been utterly confused by the promoters, starting way back on the old frontier where they would advertise any two stores, a saloon and a hitching post as "a city." And now that Reston and Columbia have met with public acclaim, the promoters put a swimming pool and a convenience store into their subdivision and call it, if not a "new city," at least a "new town."

Urban Romanticism

Well, according to Webster, a city is "any important town." What makes it important, according to Hope, is "a critical mass of people" – critical enough "to attract and support the arts and the sports." That, I would judge, takes at least half a million people. Any place smaller than that would be proud to call itself a "town" (it is a much more endearing term, anyway). A "new town," as Webster defines the ones in Great Britain, is designed to accommodate at least 20,000 people with "a planned ordering of residential, industrial and commercial development." It is also within the orbit of a large existing city and should therefore be called a "satellite town."

Americans, or at least American intellectuals, used to hate cities. But lately there is a new, somewhat abstract and usually rather romantic fervor about urban life, especially among the young, as well as among architects, like Hope, and people who write about cities, like me. But even with the help of the kids, romantic architects and writers, I have not been able to stop the flight from the American city. Most of them are losing population. The population increase is taking place in suburbia, especially in the suburban areas along the Atlantic, Pacific and Great Lakes shores.

These are what the British call "conurbations" (spreading cities that are sort of fusing together), a phenomenon that the French geographer Jean Gottmann has called "Megalopolis," and they offer a greater variety of better jobs and better educational and cultural opportunities than the less urbanized areas, so they keep attracting more and more people. And since ever more people settle in these areas, the variety and the economic, educational and cultural opportunities keep improving even more.

Transit Is Vital

One way to start doing that is to build new towns or satellite towns around rapid transit stops right in Megalopolis where you don't need any rugged pioneers but where people are within a 20-minute high-speed ride from existing universities, research centers, libraries, symphony halls, stadiums, delicatessen stores and any kind of action our civilization comes up with.

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The satellite towns are part of a new system of cities, and to build that system is a tall order, too. But we have to spend money on accommodating the growing population anyway – money for housing, for roads, rails, schools and all the rest. And we might as well spend it efficiently so as to save the tremendous investment we made in our cities over the past three centuries or so.

A system of satellites will help the existing cities in many ways. By concentrating people they fill the fare box and make rapid rail transportation economical and thus reduce the number of automobiles that threaten to overrun the city. They help preserve open space. And far from providing just "pleasant middle-class living," new towns built with government help will also provide low-cost housing close to new jobs for people who are now confined in the ghetto. As some of the people in the ghetto are able to move out, the inner city can be decongested, renovated and modernized.

In the end, making Megalopolis work – making it ecologically sound, socially just and economically productive – is really a far more exciting challenge to our technology and sense of destiny than earth cities in the sky.

It will be very hard to start this upward spiral from scratch somewhere out in the plains or hills, as Hope proposes. He is right, of course, that manufacturing need no longer be located on the waterfront. But manufacturing is dependent on labor and labor is people and how are you going to get them to move out to the sticks? They won't come before there are schools and hospitals and TV stations and movie houses and restaurants and golf courses and all the rest. There is no sense in building schools and movies before you are sure there are going to be people to fill them. But – now here is the rub – there aren't really very many people in manufacturing any more. The predominant and still growing number of jobs is in the service industries. And services, of course, depend on a high concentration of people.

So how is Hope going to get his "critical mass?" With enough cash on hand he may persuade some hearty souls to come and build his "Earth City" and stick it out until his ball park and symphony has are ready to open. It will take a long time, though. And he won't be able to persuade very many. The days of the pioneer are over.

Meanwhile, we must do something about the big cities and their sprawling suburbs and the deterioration of both. That is not a matter of liking cities or hating cities or believing there is an urban crisis or pooh-pooing the urban crisis. It is simply because, like Mount Everest, they are there. You can't *not* do something about them. Even to neglect them further is action – though very expensive and possibly explosive action.

The first thing we ought to do about them is to forget the notion that Megalopolis is "overcrowded," that there is no more space for all the people who want to live there. That's nonsense. As Bucky Fuller keeps saying, you can put the whole world population on the island of Manhattan and there would still be enough room to dance the twist. If you don't want to dance the twist you can efficiently organize the space or, as Hope puts it, "restructure our existing metropolitan areas for extensive growth."

SINGAPORE: THE COUNTRY THAT REMADE ITS ENVIRONMENT

By Jonathan Yuen

Developing countries everywhere are beginning to look on Singapore's brief, exciting history as a beacon. The tiny new nation's building of a flourishing economy with no resources beyond its strategic location on the Straits of Malacca has been inspiring and so has the industriousness of its two million Chinese, Malay and Indian people. Tough but attractive conditions for foreign private investment side by side with encouragement of local capital have brought to the 14-by-27-mile island more than 400 industrial plants in the past five years. What is less well known is Singapore's program to improve the quality of personal life for its citizens – a model for even the most sophisticated countries.

Pollution Control

"There are certain things in life that cannot be bought for money," says Singapore's Cambridge-educated Prime Minister, 47-year-old Lee Kuan Yew. "When one dirties such an amenity, everybody else has to live with it." Now, in a passion for cleaner amenities, he has created a three-man "brain trust", reporting directly to him, which draws the best pollution-control advice from around the world through the widespread use of U.N. advisers. Here are some of the steps already taken:

In June, the nation's 4,000 taxis underwent mandatory smoke tests in an effort to reduce diesel fumes from badly maintained vehicles. As an incentive, taxis brought up to the required standards may charge passengers 50 per cent extra for the first mile.

Bus companies are being warned that they will lose their franchises if their vehicles incur in total more than 30 offenses against the pollution-control regulations soon to be embodied in law.

In a positive approach to industrial pollution, the government has set an example by installing anti-pollution equipment in the national iron and steel mill in which it has a part interest. Well-publicized contests for the "cleanest plant" at the Jurong Industrial Estate have created a competitive atmosphere among industrial concerns, not only to keep fumes in check, but also to beautify their grounds with flowers and shrubs. Interestingly, last year's winner was an oil refinery.

Heavy, enforced fines make Singapore one of the world's most litter-free countries.

An ecology course is to be introduced into the secondary school curriculum by the Ministry of Education.

Seven new strategically located air-pollution monitoring stations are soon to be introduced, based on the recommendations of U.N. advisers. This brings the total of these stations to 13.

"After June," said the Prime Minister early this year, "we expect things to be much better. After September, better still. By December, we don't want to see smoke."

House Improvements

Singapore's slums used to be known as among the worst in Asia. A back-of-the-store flat in the teeming commercial section often sheltered half a dozen families, stacked to the ceiling on platforms in rooms devoid of windows. Today such overcrowding is almost a thing of the past. Nearly one-third of the population is housed in modern high-rise apartments. Every 36 minutes a new flat is built by the Housing and Development Board, which uses income from rentals and flat sales to continue new construction.

The government is vigorously encouraging citizens to enhance their homes with plants and flowers. Nearly 2,000 people – including officials bent on beautifying government buildings – are enrolled in gardening and horticultural courses conducted by the Adult Education Board. Television regularly features plant care. Contests to stimulate tree-and-flower planting – begun in 1967, when "Beautify Singapore" became a rallying cry – have achieved immense popularity and support.

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As a tangible incentive for pragmatic Singaporeans, the government's nursery-sale center offers sharp discounts on greenery to those who would beautify the balconies of their flats or prized patches of bare ground. In addition, the government now plans to grant tax relief to residents who embellish their road frontage with plants. One drab boulevard has already become a "floral mile" – because flower vendors were encouraged to set up curbside stalls.

The progressive city-state, refusing to be condemned to drabness by industrialization and apartment housing, is literally coming alive with a fresh, new, natural beauty.

Lively Minds in Sound Bodies

Man's physical and spiritual well-being gets equal attention. Every day at 5:50 p.m., thousands of Singaporeans flex their muscles with radio-directed push-ups and stationary running, based on the Royal Canadian Air Force exercise manual. This reflects the Prime Minister's dedication to a "rugged society".

Singapore, offering widespread public health services for which patients pay only a few cents per doctor's visit, is particularly proud of its huge maternity hospital, where 90 per cent of all the island's babies are born. But side by side with this effort to reduce infant mortality, the little country stresses family planning, aware that population pressures can reduce the quality of life. The birth rate has been reduced from 41 per 1,000 population in 1958 to only 19 per 1,000 now.

The approach used in family planning is most effective. A few hours after the mother has given birth, a social worker visits her in her hospital room to instruct her in the advantages of birth control. Just recovered from labor, she tends to be at her moment of prime receptivity for what the Health Minister calls his "menu card" – the choice of four medically approved methods of contraception.

To stimulate Singapore minds, strenuous efforts are being made to give the city-state a broader cultural base. To encourage the booking of internationally known artists and cultural groups, the government has removed the entertainment tax from performances which can qualify as "cultural". A National Theatre Trust encourages indigenous playwrights. Film-making has become a prosperous business.

Singapore recently launched a major music education program extending from the primary grades through university. Similarly, to promote the performing arts among secondary school students, the Theatre Trust and the Ministry of Education are jointly promoting a "dollar-a-year club" to bring outstanding theatrical entertainment within the reach of the lowest-income citizens.

Building a Future

The people of Singapore, in their quest for a better life, build from a belief that the individual has massive control over his own destiny. They have little time for foolishness; it is still not unusual to see a seven-year-old working at midnight at his family's stall. Free time is generally spent on education; for, next to sheer physical survival, schooling is the most cherished objective in Singapore. The society is still traditional: the family unit and family discipline remain strong even now.

In the quest for environmental happiness, the country is determined to retain the best of the past – while forging an even better pattern of life for the future.

Balwant Singh Saini

ARCHITECTURE AS A BIO-SCIENCE

The term 'architecture' is considered here in its wider context of built environment which not only includes buildings, but also the spaces in between. It is an environment which must satisfy man's physical, economic and social needs as well as his visual and spiritual requirements. I generally agree with Lord Llewellyn-Davies when he says that: 'Architecture is essentially a synthesis of a number of other subjects rather than something in its own right.'[1] It is wrong to say that architecture has recently become a bio-science. In by view, architecture is and always has been a bio-science, i.e. a science which deals with life. Out patterns of living and our environment influence the form of the shelters which we build for ourselves and they, to some degree, in turn shape us. In the process of evolution, the buildings play an important role in determining the future physical state and mental outlook of the occupants. and once these are modified, they in turn help generate new approaches which affect those buildings which follow.

If any doubt has been cast on the status of architecture as a true bio-science, it is because its practitioners have often been guided by intuition rather than precise knowledge. In the days prior to the technological revolution, intuition and membership of the group for whom buildings were designed, probably gave sufficient insight for successful solutions to achieve the desired built-environment. Lately, these problems have not only increased manifoldly, but have become infinitely more complex. Architects are now faced with such hard facts as the population explosion and the social disintegration of urban centres on the one hand, and space-age technology on the other. The challenge is how to use the new-found technology to the best advantage of man.

It is obvious that the old intuitional methods are no longer adequate. Architects today need far more exact data as more precise tools for designing a much greater variety of buildings to suit present day needs. Much is already known. It is possible, for instance, for architects to obtain a sensitive control of environment never before visualized by man. They no longer think of buildings as simple barriers against unpleasant weather. The new concepts not only enable them to keep out a far greater variety of undesirable elements, but also let in the more pleasant aspects of nature. In fact it is now possible for a building, except in specialized industry, to maintain as intimate a contact with nature as comfortably possible, excluding the undesirable aspects whilst exploiting the positive advantages to the full. Walls, floors and even roofs are not barriers – rather, they act as a filter between two environments which enables them to bring as much of the natural climate in as is considered beneficial. Among the major factors which have made this possible, is a better knowledge of properties of the various structural materials, knowledge which has led to the invention of new materials and methods of construction. Also, a new insight has been gained into such natural phenomena as light, heat, vapour and air pressure.

But all this knowledge, extensive as it may be, is inadequate to meet the full range of problems currently being encountered. There are extensive areas, particularly such fields as physiology, psychology, sociology and anthropology, which must contribute to provide a clearer definition of human needs. It must be realized that the architect's armoury of facts concerning his fellow man must cover a broad spectrum with each item recorded in considerable detail.

In this article, it is proposed to give examples of two such items which illustrate the complex relationship between them and the buildings which they help to define. The first consideration is man's thermal comfort, a physiological consideration, and the second deals briefly with man's psychological reactions to his environment. There are numerous other similar and

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1. Lord Llewellyn-Davies and Peter Cowan, 'The Future of Research', *RIBA Journal*, Vol. 71, No. 4, April 1964, p. 149-56. (A joint paper given at RIBA on 28 January 1964.)

equally important aspects, but these two items must serve as a representative sampling. Czech, for instance, in defining criteria for environmental effectiveness, has suggested four familiar qualities of the process of living: safety, convenience, comfort and pleasure. They include not only thermal environment, but also encompass the whole perceptual environment and indeed the whole physical environment, involving a 'full set of external conditions affecting an individual, irrespective of whether they are registered by his sensory organs or not.'[1]

Thermal comfort

What is thermal comfort? Macfarlane and others have defined it as 'certain thermal conditions under which the individual is not consciously aware of his climatic environment'.[2] Thermal comfort in a building or a settlement is achieved when its environment creates no need in the occupants to seek change. Such a definition allows for both their subjective feeling state and for a behaviouristic approach to determining comfort zones.

Contrary to popular belief, air temperature is only one of the elements of climate which affect thermal comfort and consequent physical well-being. Others include solar radiation, humidity and the extent of air movement. The interrelationship between these factors is complex and, to a degree, they are interdependent. Movement of air, for instance, reduces the physical effects of humidity, and radiation may either reduce or increase discomfort induced by air temperature.

Physiologists agree that the human body maintains its temperature equilibrium through a dual control of heat-producing and heat-loss factors. In order to keep a healthy deep tissue temperature of ±98.4° F, the body is continually adjusting to its surroundings. If these conditions happen to be extreme, or the body itself is not healthy, acclimatized or suitably clothed, then this equilibrium is upset by the slow increase in the tissue temperature until it causes heat stroke or intense fatigue. An individual's ability to adapt himself to environmental changes around him affect not only his comfort but also work output and efficiency.

As a result of a series of subjective tests and scales of measurement, certain thermal conditions have been variously defined for classification of 'comffort zones' and are intended for use as design criteria. These zones, which tend to vary according to geographical location, acclimatization, ethnic origin, sex, age and actiivity at the time of tests, have been summarized in several papers.

For an architect's purposes, the inadequacies of such assessments become obvious because they are mainly based on the study of people at rest. The variety and range of contemporary types of building required are likely to involve the study of an equally large range of activity levels, all of which must be considered in terms of metabolic output. According to Nevins: 'the introduction of 5 min. walking at 25 min. intervals into test programs resulted in lowering levels of comfortable temperature by 6° F.'[3] It indicates the growing recognition of the fact that a school class-room, a maternity ward, a restaurant or a factory, are likely to require an entirely different thermal environment fort comfort from that acdepted for a residence in the same region.

A thorough understanding of such information is a necessary prerequisite to the efficient design of a building. Even so, stresses placed on the human physiology vary widely from location to location throughout the world, thus posing a greater diversity of problems for the architect.

Climatic Zones

Broadly speaking, one could divide the world into four basic zones: cool; temperate; hot arid; and hot humid. In each of these, building forms have been influenced, not only by thermal forces, but also those of wind and other climatic factors.

In this regard, a great deal can be learned by observing nature; and to do this, practitioners from other bio-sciences can greatly assist the architects. The evolution of indigenous building traditions has often followed a parallel path with the life forms created by nature. A leaf cross-section, for instance, shows very clearly the environmental effect in plant morphology. Plants elongate or close surfaces according to favourable or adverse climate. In a very cold region, the forms of leaves such as pine needles, are generally more compact to enable them to withstand unfavourable conditions. In

1. Z. Czech, 'Potentials of a Determinate Design System', *Architectural Science Review*, Vol. 4, November 1961, p. 149-52.
2. W. V. Macfarlane, 'Thermal Comfort Zones', *Tropical Building Studies*, Vol. 1, No. 2, 1962, University of Melbourne, Department of Architecture.
3. R. G. Nevins, 'Criteria for Thermal Comfort', *Building Research*, Vol. 3, July 1966, p. 27-30.

temperate areas, by contrast, the friendly environment encourages leaves to open up to a considerable size. The strenuous climates of hot arid areas cause plants like the cactus to hide their cells in bulky section, and reduce leaf surfaces to a minimum. Their forms are massive for protection. Leaf sizes, however, increase in a climate of the hot-house variety that is warm and humid.

This behaviour of plants in different environments has its counterpart in animals and birds. It is also reflected in the form which man has devised to shelter himself – shelters such as the igloo of the North American Arctic; the mud and stone houses of the desert belt of the old and the new world, and the light and airy frame structures of the humid tropics. Traditional settlements in the hot dry regions have a remarkable similarity to desert plants such as cacti, where dwellings are closely packed together so as to reduce the total surface exposed to the hostile outside environment.

That this is a valid approach to building in hot, dry regions has been painfully realized by Israeli architects, whose earlier plans for Beersheba in the Negev Desert were based on a more scattered layout following the English garden city concept.[1] This created extraordinary problems of environmental control. The revised proposals for new towns in that region aim at a more concentrated layout where the upper storeys of some of the houses are set at right angles across the street. This method not only changes the rhythm, but also gives areas of valuable shade, so necessary in the desert climate. This low-level development is surrounded by five-six storey row houses, organized in long lines which act as a buffer and protect the inner areas from sand and dust from the surrounding country-side. The scale is human, and all streets within the settlements are reserved for pedestrians only.

An efficient, but expensive way to achieve physical comfort in a building is to confront the climate directly by installing a complete air-conditioning system. However, very few people can afford such a luxury. The main challenge for architects thus lies in providing comfort by attuning their buildings to the climate.

In order to plan a building for physical comfort, it is necessary, not only to understand the nature of the local climate and the associated reactions of potential occupants (as discussed earlier), but also its impact on building components and how they perform under particular conditions. This means that factors such as temperature, humidity, rate of air movement and radiation from floors, walls, ceilings and other surrounding surfaces, all of which contribute to human comfort, must be converted into a language which can be expressed in the design of buildings.

External Factors

Apart from buildings themselves, indoor (and outdoor) comfort is also considerably influenced by external factors such as vegetation, water and the nature of the surrounding open spaces. In a hot, dry setting, for instance, where the environment presents extreme conditions and where the landscape is drab and monotonous, vegetation and water not only improve physical comfort conditions, but also create visual stimulation. Water helps to achieve a pleasant environment through an evaporative process which, although it increases the relative humidity, at the same time decreases the dry-bulb temperature of the surrounding area.

Intelligent and judicious use of vegetation in the form of trees, creepers, vines, shrubs and grasses can be a great asset, not only in improving the micro-climate of a building, but also the environment of the settlement as a whole. Studies by Deering and others indicate how plants and grasses are able to: (a) reduce heat load on exposed surfaces by obstructing the passage of direct solar radiation, which is achieved by absorbing a high percentage of energy through the process of photosynthesis and also because of the reflective properties of some foliage; (b) assist in lowering the air temperature by evaporative cooling as a result of transpiration; and (c) act as a wind break and arrest the flow of dust and sand into settlements.[2]

In view of the tendency of vegetation to affect air flow and create high and low-pressure areas around the buildings, the need for correct and careful selection of trees and shrubs assumes considerable importance if the free flow of cool air is not to be obstructed. Planting can be designed to direct and accelerate a beneficial air movement into the building provided the behavior of the air flow is predictable in various situations. White's findings are valuable to an architect.[3] When used with the knowledge of the appropriate vegetation which can

1. 'Beersheba', *Israel Builds*, Tel Aviv, Ministry of Housing, 1964.
2. R. B. Deering, *Technology of Cooling Effects of Trees and Shrubs*, Washington, 1953. (Building Research Advisory Board, conference report no. 5.)
3. R. F. White, *Effects of Landscape Development on the Natural Ventilation of Buildings and their Adjacent Area*, Texas, March 1945. (Eng. Exp. Stn. research report 45); also cited: Olgyay, *Design with Climate*.

be grown in a particular area, and of the pattern of prevailing winds, it should be possible to approximate desired conditions from most climatic situations.

These qualities of water and vegetation have always been appreciated by traditional desert communities, who have exploited them as major design elements, in city planning as well as within individual structures. Over thousands of years, the traditional architecture of North Indians, Middle-Eastern and Spanish people developed various techniques of this kind, which in turn determined the character and usefulness of outdoor space. In India, such practices are as old as the Indian culture itself.

Kalidasa's plays and the later writings of great ancient scholars like Bana of the seventh century contain a host of word pictures of gardens surrounded by high walls, where elements such as flowers, shrubs, rockeries and artificial watercourses are arranged with numerous variations. The residential palaces of the Moguls invariably enclosed a garden cooled by water which, while serving the dual purposes of nourishing the plants and cooling the atmosphere, was also a delight to the eye.

Surfaces surrounding the buildings in a town need very careful attention. The amount of radiation absorption of various ground surfaces depends upon their texture density and colour, their heat conductivity and capacity, and also their moisture content. The heat storage capacity of granite, for instance, is twice that of damp sand. An asphalt street absorbs large quantities of heat during the hottest part of the day and continues to re-radiate this stored-up heat during the late afternoon and evening. This heat can be carried into the building and is a significant factor in increasing the temperature level inside it. Vegetation in the form of trees, shrubs and large stretches of grassed areas has proved extremely useful in reducing the incidence, not only of this type of heat gain, but also reflected heat and the glare which is invariably associated with it.

Design of Open Spaces

Control of heat, sand and dust, by using vegetation, water and soil stabilization, opens up the whole question of the role which open spaces play in modifying the micro-climate. It is obvious that the value of total design and order in any environment depends upon the successful relationship of internal as well as external spaces.

This relationship is nowhere better seen than in the courtyard concept which, since time immemorial, has been regarded as an essential ingredient in the architecture of the hot, dry lands. One can cite numerous examples of successful courtyard designs in the traditional architecture of North Africa and the Middle East where climate control and the need for privacy and religious observations have been important design determinants. But even in countries such as Japan, which do not lie in the hot climatic belt, a courtyard has always been regarded as an important part of a dwelling. In Japan, it has a spiritual and philosophical basis of design. Conceived as a work of art and executed as a piece of landscape design, it is intended for contemplation rather than purely practical use. Small garden courts were popularized and developed in every detail during the eighteenth and nineteenth centuries and are still widely used.

But somewhere on the way, due perhaps to our pre-occupation with technology, this aspect of planned open space has in more recent times been ignored. In the post-war years, however, a large number of architects have again used the courtyard concept which has been developed to form a basis for a neighbourhood plan with open spaces extending from private courtyards to larger parks and gardens, shared by the entire community, thereby inducing a very satisfying social environment.

There is an obvious need to analyse the vital functions of open space and the use people make of it. Its role in architecture must be recognized and exploited to the full. The relationship of road, house and site must be scientifically examined. Some of the established design concepts must be re-assessed. There must be a link between the sciences of sociology, biology, to name but a few, with architecture. These sciences aim at identifying and defining basic human needs, without which information it would be pointless to attempt the synthesis which must be performed to achieve the maximum improvement in the human environment.

Psychologial Comfort

The above discussion has tended to suggest the use of architecture as a bio-science aimed at providing physical comfort and relief, but it is important to remember that a comfortable body is no guarantee of a comfortable mind. The need for man to live in perfect harmony with nature has never been more important than it is now when technology is slowly nibbling into whatever natural resources man has inherited on this biosphere. The issue is complex and a successful solution demands the contributions of other specialists such as psychologists, anthropologists and social scientists.

Some of the studies of problems of adaptation in newly established isolated settlements in central Australia, for instance, have thrown considerable light on the mental stresses caused by isolation and other associated factors. They point to the way in which architecture can assist in overcoming them.

A major problem is that of boredom, which largely stems from the lack of sufficient activity in an isolated region. Boredom affects most people, but for women and children who, unlike menfolk, spend the bulk of their time at home, it can be of serious significance. In a setting which is by and large monotonous, there is little opportunity for mental stimulation. Confined within the four walls of a house, frustrated and cross children upset their mothers who in turn, convey these feelings to their husbands. Consequently, the rate of breakdown in family structure is extraordinarily high among these people.

There have been a number of experiments where the effect of monotony on human behaviour has been studied. Some of the most interesting work on 'sensory deprivation' has been that by Woodburn Helron, who found that human beings subjected to complete monotony showed definite signs of impairment of thinking.[1] In laboratory tests. Heron found that even 'a rat in a maze will use different routes to food, if they are available, rather than the same one all the time. It will tend to avoid areas in which it has spent considerable time and explore the less familiar areas'. Under extreme conditions of isolation in a completely monotonous environment, Heron also found that the subjects become 'markedly irritable' and developed 'childish emotional responses'.

These studies by Heron and others perhaps contain clues to the reasons for increasing juvenile delinquency which is assuming alarming proportions in all our big cities. They point to the need for provision of an environment which is able to supply perceptual stimulation – aural, visual and tactile.

Architecture can help to provide much of this needed stimulation by aiming at a high level of architectural and aesthetic standards, which avoid monotony and ensure considerable diversity in surroundings. If these aims can be achieved, they will be reflected in the fostering of a spirit of community belonging, civic pride, integration and enjoyment.

Apart from recreational spaces, good comfortable housing is perhaps the most important element in a settlement. The housing types need to avoid drabness and to achieve this may involve research into evolving new density patterns which encourage human contact and exchange, and provide people with conditions in which they can feel territorially at home.

In the study of social environment, it is obviously important to know how it satisfies the needs of individuals, groups and institutions. Some social scientists are dubious, however, and have suggested that architects tend to overestimate the influence of environment on people.[2]

They point out that the need to study social values and requirements, and to embody the results in design does not rest upon the assumption that 'one kind of environment makes people club together and feel more friendly towards each other, while another keeps them apart and walls them up with loneliness. Possibly the built-environment has some marginal effect of this kind, but it will influence rather than determine what happens'. Whatever the extent of the architect's contribution to states of mental well-being, the study of social environment is essential. It enables the architect to create surroundings which make it easier for people to do the things they want to and have to do, to live the way they want, and to make it unnecessary for them to do the things they do not want and would not otherwise have to do. With the help of social scientists, preservation of high urban standards, of services, and space and visual amenities would be possible. An effective interrelation of buildings, parks that are popular, and shopping centres that are uncrowded could be achieved. In short, a social scientist can help the architect to design by feeding him information on the nature of people and the requirements of their daily life.

A notable example of the contribution of social scientists can be seen in the aluminium township of Kitimat in Canada.[3] A social scientist, Clarence Stein, was included as a member of the design team and proposed a number of interesting activities, the background for which had to be created within the built-environment. The team was largely guided by his observations that, among the contributory factors which lead to juvenile delinquency in a city, is a situation where children are no longer responsible for chores such as driving home and milking cows, feeding pigs, churning butter; activities which used to be part and parcel of everyday living in the country. Deprived of this participation they lost a very important sense of being

1. W. Heron, 'Pathology of Boredom', *Scientific American*, Vol. 196, January 1957, p. 52-6.
2. F. J. Langdon, 'The Social and Physical Environment; A Social Scientist's View', *RIBA Journal*, Vol. 73, No. 10, October 1966, p. 462-4.
3. Clarence S. Stein, 'Kitimat', *Architectural Forum*, Vol. 101, July, August and October 1951.

generally needed. Kitimat designers understood this and as a result included a greater range of such items as trees to climb on, play areas, stone walls to walk on and some public areas away from the asphalt roads. This also provided the children with a chance to associate themselves with adults and to produce useful things for the community as a whole.

The work at Kitimat and some other new towns has a particular application to the development of inner city areas where children grow up in multi-storey buildings. Many of these buildings, particularly those erected by housing authorities, are in congested locations where the traditional play areas, the backyard, the quiet suburban street, the bush and the waterfront are no longer available to children. The futility of the 'asphalt-swings' playground has been obvious in many present-day housing developments. It is insufficient for the child's all-round development. In the playground, children need magic shapes, which can be a tiger one day and a train the next. They need to touch different textures; they need the experience of sliding down and jumping off, the challenge of balancing, the fun of getting under or through or on top of things, the mystery of enclosed spaces. In short, children need areas which allow them to use their imagination, where they, rather than the equipment, do the work. Such an environment can only be provided by an architect who is sensitive to the children's requirements. It points to an immense and urgent need for research in environmental psychology.

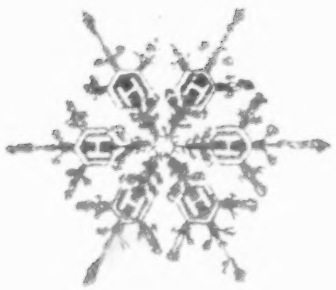
Conclusion

The above examples are only two of the many facets of architecture which demand investigation in depth. Others are acoustic environment, studies in participation, the effects on human physiology and psychology of matters such as colour, texture and room configuration. This emphasizes the need for contributions to architecture from other disciplines. How to bring about this?

It must be realized that the very complex nature of the architect's work and his basic training as a synthesizer of a number of disciplines and findings relevant to various aspects of building enables him to play a pivotal role amongst the bio-scientists who are involved in the problems of improving the quality of life in our biosphere. There is obviously a need to train architects who are not only aware of the physical and technical aspects of building but are also knowledgeable in one or more of the other sciences. They could act as a liaison between the architects and the other disciplines, and be in a position where they not only understand the needs of the practising architects, but are also able to select that part of another science or prepare a brief in a manner in which it could be directly applied to a building solution.

There is also need for research and development involving inter-disciplinary teamwork. A certain degree of conflict is inevitable in a programme where, apart from variations in temperament, many of the participants are likely to possess vastly different values and goals. The work of a team is bound to falter unless some attempt is made to create common ground and develop some form of similarity in aims and objectives. The people most intimately concerned with the problems of research into building either belong to one of the pure scientific and academic disciplines, or are architects, whose work has grown upon the practical application of the former. George Foster maintains that 'an academic discipline stresses theoretical research whereas a profession stresses goal-directed action. The aims are by no means mutually exclusive, but they are different and when the two aims are pursued in a common project, a relationship of interest is essential'.[1]

1. George M. Foster, 'Technical Aid and Social Science: Some Problems of Teamwork', *Traditional Cultures and the Impact of Technological Change*, Chap. 12, p. 241-58, New York, Harper & Bros., 1962.



HEADLINE

Ideology Has Nothing To Do With It

AN ENGELS' VISION BLURRED BY EAST EUROPE'S POLLUTION

By Dan Morgan

BELGRADE – "The factory town transforms all water into stinking manure," wrote philosopher Friedrich Engels of the squalid capitalist industrial centers of his time. He went on to predict that socialism would put a stop to the "present poisoning of air, water and land."

A century later the Communist countries of Eastern Europe are a long way from fulfilling Engels' environmental vision. In many places east of the Elbe, streams are indeed being turned into "stinking manure" – by untreated sewage and industrial waste from state-owned plants. Tons of sulphur-laden ashes from coal-burning power plants and factories desecrate acres of forest and cloud city skylines. And the overall visual impact of Eastern Europe – in contrast with the manicured highways of West Germany or the decorative villages of provincial France – is often one of shabbiness and neglect.

Last July in Budapest, the top Communist leaders of Eastern Europe formally recognized pollution as a problem when they called for the environment to be placed on the agenda of an East-West security conference.

A conference on the environmental situation has been called by the East European leaders in Prague for the spring, and some of the shackles have been taken off the controlled Communist press to enable it to expose the reasons for air and water pollution. In Poland – by far the most advanced in pollution control measures and public awareness of the problem – the resulting attacks on industrial violators have been described by one factory manager singled out as an offender as "sadistic."

A Classic Conflict

The reason for this new mandate to the press is clear – an environmental crisis that has begun to equal the one already afflicting the West in some respects. Moreover, pollution now poses for the Communist leaders some fundamental choices between productivity and cost-saving on one hand, and steadily worsening conditions for work and recreation on the other.

As the Polish Baltic riots showed in December, Communist populations want better conditions for daily life. But pressure to cut production costs places a powerful check on extensive controls, and one which is aggravated by increasing competition for world markets and acute shortages of money for new technological advances.

The Vistula River, for instance, is the picturesque central artery of Poland from which a beautiful mermaid was said to have emerged centuries ago and chosen the site of Warsaw. Today Warsaw – otherwise one of the best designed cities in Eastern Europe – pumps most of its sewage untreated into the Vistula, and complete sewage treatment facilities may not be ready for as much as 10 years because of the tremendous engineering costs of driving a new pipe system through the underground rubble that lies beneath the newly built capital.

Belgrade sunsets take on a bluish hue from the haze of smoke that rises from the factories along the Sava River, but Czechoslovakia's northern Bohemian mining and industrial region may be the East bloc's dirtiest district. In northern Bohemia, darkness comes at noon. It is brought on by the mingling fumes from chemical and electric power plants that often become so dense that they force motorists to switch on their headlights in broad daylight on a sunny morning, as they drive past the moonscapes and slag heaps of Most and Usti on the Elbe.

The region reflects a classic conflict between state needs and human requirements. Since 1945, Czechoslovakia's use of coal for electrical power has tripled, and the next five years of industrial growth calls for even greater power production. Like most of Eastern

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Europe, Czechoslovakia relies heavily for electrical power on the burning of soft brown coal, one of the dirtiest fuels known to man. Northern Bohemia is rich in it. Because the crumbly dusty substance cannot be transported easily and must be burned where it is mined, the area has borne the brunt of new electrical power installations.

Grim Statistics

Results are plain to see. The party newspaper, Rude Pravo, estimates that 50,000 acres have been damaged by chemical wastes in northern Bohemia, and that 17,400 tons of ash fall on the area every year. Evergreen forest have died out altogether in some places.

Workers at local factories have threatened to move to cleaner parts of the country, and the central government has responded with some concessions to local interests, such as a program of supplemental cheese and milk for children to combat health threats posed by pollution, and one-month fresh air vacations for the school children.

In 1969, a new electricity works for the area was approved by the Prague government. Since then, the district committee has been demanding such pollution mitigators as a 600-foot chimney to disperse ash more widely, and limits on the amount of coal that can be burned at the new site.

"It would be possible to eliminate the pollution, but it would double the cost of electricity," said Dr. Mirko Matyas of the local governing committee, and a specialist on the problem. The main threat to health are the toxic sulphur dioxide fumes, although the ash is extremely unpleasant. Gases are still below danger levels, Matyas says.

The problem of sulphur dioxide fumes is serious in Eastern Europe because of the continuing use of soft coal, whose sulphur content is roughly twice as high as that of hard coal. Eliminating it cheaply is a problem that has defied scientists in some 3,000 institutes around the world. Czechoslovak and Polish officials speak of installing a Japanese process for turning the sulphuric wastes into ammonium sulphur compounds – in effect by building a second plant next to the coal-burning installations. But the cost is prohibitive.

"It may be that this is a scientific problem that will not be solved until we no longer are burning coal," said a Prague chemist pessimistically.

Pollution in Czechoslovakia today seems curiously fitted to the present mood of political discouragement 30 months after the Soviet invasion. Perhaps the saddest of all reminders of an environmental crisis in the making is the city of Prague itself, once among the loveliest capitals in the world. Today, garbage piles up in back alleys and on humid or misty evenings, smog completely obscures the magnificent view of Prague Castle across the Vltava River.

Rivers of Black

But the Czechs have no monopoly on pollution in the Communist bloc. Nature-loving East Germans, outdoor enthusiasts by tradition, have also begun to take fright at the industrial landscapes they see around them.

"There are no fish in the Saale river near Halle," wrote a reporter for the weekly Wochenpost recently. "The water in the river is black, and smells like a chemical experiment. On summer days, when there is little wind, a pall of smog hangs over Bitterfeld, Halle, Schkopau and Leuna, increasing the heat and making it difficult to breathe."

East German district water boards are now cracking down with fines for industrial polluters and with fees for use of river water, a measure aimed at forcing plants to economize on water use. A number of plant managers have been practicing self-criticism in the press. Dr. Eberhard Anton of the Buna chemical works recently described fines against his plant as "absolutely justified," and added that pollution could not be checked by "platonic [sic] declarations."

Esthetic blemishes such as these pale by comparison with the sheer economic and health impact of pollution in certain parts of Eastern Europe, however. Examples:

- Lead and carbon monoxide from automobile exhausts in Prague is often "above the norm," according to the Communist Party newspaper Rude Pravo. (Governments in Eastern Europe have shown little or no concern for auto safety requirements or exhaust emission standards, though Hungary this year initiated controls on diesel bus exhausts, which are infamous polluters in Budapest.)
- One-third of the rivers in Poland are so polluted that they cannot be used either for drinking or agriculture. Fish kills have occurred near paper manufacturing plants. Out of 14,000 industrial plants in the country, 8,400 send wastes directly into rivers. And the Warsaw daily Zycie Warzawy describes 600 plants as "oppressive" polluters and 300 as "downright dangerous."
- The Czechoslovak town of Melnik, north of Prague, grows the succulent grapes for a pleasant white wine drunk all over the country. But experimental mice

which were fed ashes emitted by the local power plant died in two days. (Americans consume almost three times as much energy per person as Czechs and Slovaks, according to Prague figures, but both countries produce about the same amount of pollutants per head – 6,000 pounds a year.)

• Bathers in the select Yugoslav resort town of Dubrovnik were covered with tar and oil last spring. Increased oil tanker traffic in the Adriatic and off-shore drilling pose an ever-present threat that a disaster could someday ruin beaches and hurt the Yugoslav tourist trade which Belgrade depends on to offset an unfavorable trade balance with the West.

The East European governments are not blind to these phenomena. But the problems that have become obvious now have been long accumulating in the years of industrialization, and obstacles to solving them are to a large extent built into the economic and political infrastructure of the Communist countries.

There seems to be little immediate hope for a radical shift away from brown coal as a major fuel, for example. Atomic power is only on the distant horizon. Except for Yugoslavia and Romania, hydroelectric power is unavailable. The introduction of natural gas from the Soviet Union is making it possible to reduce coal burning in housing projects and private homes, but the big Soviet supplies will not start flowing West for several years and then a large portion will be earmarked for West European markets.

Under the auspices of the "Budapest Clean Air Committee," the government in the Hungarian capital has begun to convert the 90 per cent of city housing heated with coal. But the project is costly and slow. So far 1,000 buildings in the downtown core have been switched over to gas or central hot-water city heating. At the same time, the Hungarian government is trying to decentralize industry, half of which was until recently concentrated in the capital.

Nevertheless, much of Eastern Europe appears to be wedded to brown coal for the better part of a decade.

Regional cooperation on eliminating the causes of pollution has been surprisingly limited, considering the tightly-knit character of the Communist bloc. Polish officials, for instance, complain that for years Czechoslovakia has been polluting the Oder River with salty wastes from coal mining operations, a short distance before it flows into Poland. The northern Oder is a river of great historic importance to Poland, since it forms the country's post-World War II western boundary. But more important, the river is a main source of water to industrial Silesia in Poland which is desperately short of water resources.

Under an international agreement, chemical pollutants in it are measured at the Polish-Czechoslovak frontier, but Polish officials say drily that the monitoring does not help much to eliminate the poisons. A leading Warsaw official conceded that "it's true that centrally planned societies have a better chance to solve these problems than others." But he added that the solution "demands huge capital investments which are often beyond our reach."

No Smoke, No Bread

For months now, Poland's Pulawy nitrogen fertilizer plant has been under attack by the Krajobrazy Club, an organization of journalists that specializes in defending the Polish environment in print. One commentator said that a contaminated cloud of ammonium nitrate aerosol fog reaches 10 miles or more from the plant and threatens 22,000 acres of land.

The practical answer given by plant director Mieczyslaw Kolodziej, a "devoted camping man," struck at the core of the problem.

"Myself, with all my love for nature, I cannot agree to treat artificial fertilizers as a nightmare of contemporary man," he said. "In the past years we were able to raise grain production from 17 to 22 hundredweight per half acre – partly due to use of fertilizers. For the dollars we had to pay to import grain we could build five or six plants the size of Pulawy every year. To me the issue is simple. If we did not have Pulawy we would not have bread."

However, the director admitted that at the time the first nitrogen plant was built "we had no experience whatsoever on nitrogen compound fallouts. . . even today we do not know well all the poisonous compounds."

This conflict between an industry and the community it serves could be typical for East or West. But there seems to be some question whether the state ownership of factories may not actually put Communist governments at an embarrassing disadvantage in taking forceful action against industrial violators of pollution laws.

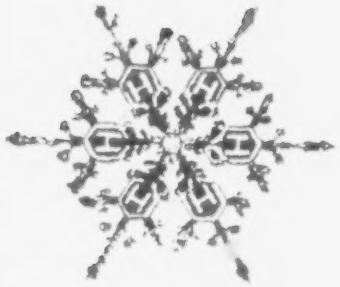
"In the United States," claimed an ecologically minded regional planner in Katowice, Poland, "you can close down a plant. Here the plant belongs to the state and closing it would therefore damage the whole society."

PERSPECTIVE

Hope springs eternal in the human breast;
Man never is, but always to be blessed.
The soul, uneasy, and confined from home,
Rests and expatiates in a life to come.
Lo, the poor Indian! Whose untutored mind
Sees God in clouds, or hears him in the wind;
His soul proud science never taught to stray
*Far as the solar walk** or milky way;
Yet simple nature to his hope has giv'n,
Behind the cloud-topped hill, an humbler heav'n.

--Alexander Pope (1688 - 1744)
An Essay on Man

**Editor's Italics*



A Theology Of The Earth

Dr. Rene Dubos

". . .our Garden of Eden will have to be created in our own backyards and in the hearts of our cities."

Ladies and gentlemen, the title of this lecture would be pretentious if it did not express profound feelings that I experienced a few months ago at the time of the Apollo 8 mission. Shortly after the return to earth of Apollo 8 the science editor of the Columbia Broadcasting System, Earl Ubell, interviewed the crew over the CBS network. Through skillful and persistent questioning he tried to extract from the astronauts what had been their most profound impression during their trip through space. What turned out was that their deepest emotion had been to see the earth from space. The astronauts had been overwhelmed by the beauty of the earth as compared with the bleakness of space and the grayness of the moon.

On the whole, I have been rather skeptical concerning the scientific value of the man-in-space program. But, while listening to the Apollo 8 crew, I became interested in that effort because I felt that it would pay unexpected dividends – namely, make us objectively aware, through our senses as it were, of the uniqueness of the earth among other bodies in the sky.

The incredible beauty of the earth as seen from space results largely from the fact that our planet is covered with living things. What gives vibrant colors and exciting variety to the surface of the earth is the fact that it is literally by the very fact that the microbes, the plants, the animals, and man have generated on its surface conditions that occur nowhere else, as far as we know, in that part of the universe that we can hope to reach.

The phrase "theology of the earth" thus came to me from the Apollo 8 astronauts' accounts of what they had seen from their space capsule, making me realize that the earth is a living organism.

My presentation will be a mixture of the emotional response of my total being to the beauty of the earth, and of my mental processes as a scientist trying to give a rational account of the earth's association with living things. The phrase "theology of the earth" thus denotes for me the scientific understanding of the sacred relationships that link mankind to all the physical and living attributes of the earth.

I shall have to touch on many different topics because I want to convey my belief that we have collectively begun to engage in a kind of discovery of ourselves – who we are, where we belong, and where we are going. A few lines from T.S. Eliot in his poem "Four Quartets" seems to me the ultimate expression of what I shall try to express emotionally and to analyze scientifically:

We shall not cease from exploration
And the end of all our exploring will be
To arrive where we started
And know the place for the first time

All archaic peoples, all ancient classical cultures, have practiced some form of nature religion. Even in our times a large number of isolated, primitive tribes in Australia, in Africa, and in South America still experience a feeling of holiness for the land in which they live. In contrast, respect for the earth and for nature has almost completely disappeared from industrialized people in most of the countries that have accepted the ways of western civilization.

Primitive religion, with its sense of holiness of the environment, was always linked with magic. It is easy to understand how there can be links between primitive religious beliefs and the attempts to control nature through the mysterious influences of the world. Even though they always have coexisted among primitive people, religion and magic represent two very different kinds of attitudes.

A lecture delivered on 2 October 1969 at the Smithsonian Institution in Washington, D.C., under the sponsorship of the Smithsonian Office of Environmental Sciences. ©Copyright Smithsonian National Associates.

In the words of the anthropologist Malinovsky: "Religion refers to the fundamental issues of human existence while magic turns round specific, concrete and practical problems."

Most of my remarks this evening will be based on the conviction that the ecological crisis in the modern world has its root in our failure to differentiate between the use of scientific technology as a kind of modern magic and what I shall call modern religion, namely, knowledge as it relates to man's place in the universe and, especially, his relation to the earth.

All ancient peoples personified a locality or a region with a particular god or goddess that symbolized the qualities and the potentialities of that place. Phrases such as "the genius of the place" or "the spirit of the place" were commonly used in the past. All followers of ancient clutures were convinced that man could not retain his physical and mental health and fulfill his destiny unless he lived in accordance with the traditions of his place and respected the spirit of that place. I believe it was this attitude that helped ancient peoples to achieve rich and creative adjustment to their sourroundings. Now you may say: "Spirit of place; genius of place? This is no longer for us. We are far too learned and sophisticated."

Yet, rationalistic and blase as we may be, we still feel, deep in our hearts, that life is governed by forces that have their roots in the soil, in the water, and in the sky around us. The last part of Lawrence Durrell's book *Spirit of Place* deals with this very topic. There is not one among us who does not sense a deep meaning in phrases such as "the genius of New England" or "the spirit of the Far West." We still sense that there is some kind of uniqueness to each place, each location, which gives it a very special meaning in our minds. But while we pine for the sense of holiness in nature, we do not know how to introduce this sense in our social structure. I am convinced that this has much to do with the ecological crisis.

I am not the first to express the feeling that we shall not be able to solve the ecological crisis until we recapture some kind of spiritual relationship between man and his environment. Some two years ago, for example, the learned American scholar Lynn White, Jr., a professor at the University of California in Los Angeles, delivered before The American Association for the Advancement of Science a special lecture titled "The Historical Roots of Our Ecologic Crisis." This lecture must strike a very sensitive chord in the minds of Americans because it has been reporduced again and again in several journals – ranging from *The Oracle*, the organ of the Hippie movement in San Francisco, to the plush magazine *Horizon*. Among the many interesting and important things White says, I single out a particular item with which I disagree in part. He stated that, in his opinion, the lack of reverence for nature on the part of modern industrial man, especially in the United States, and the desecration of nature by technology are consequences of biblical teachings. He traced them to the first chapter of Genesis in which it is said that man and woman were given the right and the duty to replenish the earth, subdue it, and have dominion over all living things. According to White, this biblical teaching has had such a profound and lasting influence on western civilization that it has made modern man lose any feeling for nature and to be concerned only with the conquest of nature for his own benefit. Also, White sees no hope of retracing our steps through science and technology because both exemplify the authority expressed in that statement in the first chapter of Genesis. The only solution to the ecological crisis, therefore, is to try to recapture the worshipful attitude that the monks of the Franciscan Order had toward nature in the thirteenth century. The last sentence of White's lecture is, if my memory serves me right, "I propose Francis as a patron saint for ecologists."

All of us have some kind of sentimental, romantic sympathy with Lynn White's thesis. All of us are happy that there have been practical expressions of this attitude in the development of the national parks and in the attmepts to preserve as much wildlife as possible. By preserving the state of certain wilderness areas, with their animals and plants, their rocks nad marshes, mankind symbolizes that it has retained some form of respect for the natural world. In passing, it is not without interest that the United States – the country which has certainly been the most successful and has done the most toward achieving dominion over the earth through technology – is also the one country which is doing the most to save some fragments of wilderness. I wonder at time whether Glacier Park and Monument Valley do not represent a kind of atonement for God's own junkyard.

Despite my immense admiration for Lynn White's scholarship, I find it difficult to believe that the Judeo-Christian tradition has been as influential as he thinks in bringing about the desecration of the earth. One does not need to know much history to realize that the ancient Chinese, Greek, and Moslem civilizations contributed their share to deforestation, to erosion, and to the destruction of nature in many other ways. The goats of primitive peoples were as efficient as modern

bulldozers in destroying the land. In any case, the Judeo-Christian attitude concerning the relation of man to nature is not expressed only in the first chapter of Genesis. The second chapter of Genesis states that man, after he had been placed in the Garden of Eden, was instructed by God to dress it and to keep it – a statement which has ecological implications. To dress and keep the land means that man must be concerned with what happens to it.

Man is rarely, if ever, just a worshiper of nature, a passive witness of its activities. He achieved his humanness by the very act of introducing his will into natural events. He became what he is while giving form to nature. For this reason I believe that ecologists should select St. Benedict as a much truer symbol of the human condition than Francis of Assisi. Most of you probably know little about St. Benedict, perhaps even less about the history of the Benedictine Order. So allow me to elaborate on them for a few minutes because they represent a topic that is crucial to my personal attitude toward conservation.

St. Benedict created the first great monastery in the western world on Monte Cassino, in Italy, in the sixth century. He must have been a wise man, because when he formulated the rules of conduct for Monte Cassino – rules which became a model for monastic life all over the world – he decided that the monks should not only pray to God but also should work. Moreover, he urged that the monastery be self-sufficient. The rule of work and the need for self-sufficiency led the Benedictine monks to master a multiplicity of practical arts, especially those relating to building and to architecture. The monks learned to manage the land in such a manner that it supplied them with food and clothing, and in such a manner that it retained its productivity despite intensive cultivation. Moreover, they developed an architecture which was lasting, well-suited to the country in which they lived as well as to their activities, and which for these reasons had great functional beauty. Those of you who have traveled over the world know that the Benedictine monasteries are marvels of medieval architecture.

It seems to me that the Benedictine rule implies ecological concepts which are much more in tune with the needs of the modern world than is the worshipful attitude of St. Francis, Perhaps most influential among the monks who followed the Benedictine rule were those of the Cistercian Order. For reasons that I shall not discuss, the Cistercians established their monasteries in the lowlands and swamps: consequently, they had to learn to drain the land, and therefore they learned to use water power. And, through these technological practices, they converted areas of swamps and forests (that were not suitable for human habitation because of the prevalence of malaria) into wonderful fertile land which now makes up much of Europe's countryside.

If I have talked so long about St. Francis and St. Benedict it is not to give you a course in the history of medieval religion. Rather it is to illustrate two contrasting – but, I believe, equally important – attitudes toward nature: on the one hand, passive worship, on the other, creative intervention.

I have no doubt that the kind of worship symbolized by St. Francis helps man to retain his sanity by identifying himself with the totality of creation from which he emerged. Preserving the wilderness and all forms of wildlife is essential not only for esthetic and moral reasons but also for biological reasons.

Unfortunately, it will become increasingly difficult in the modern world to protect the wilderness from human use. In fact, no longer can there be any true wilderness. No fence is tight enought to shut out radiation clouds, air and water pollution, or noise from aircraft. Some ten or twenty years ago we could still escape from the insults of technological civilization by moving to the Rocky Mountains, to the Greek island, or to the islands of the Pacific Ocean, but now the national parks and the isolated islands are almost as crowded and desecrated as Coney Island. The only solution left to us is to improve Coney Island. In his short novel *Candide*, Voltaire pointed out that Candide discovered at the end of his adventures that the surest formula for happiness was to clutivate one's own garden. I believe that our Garden of Eden will have to be created in our own backyards and in the hearts of our cities. Just as the Benedictine monasteries had to apply, although empirically, ecological principles so as to remain self-supporting and viable, so must we learn to manage the earth in such a manner that every part of it becomes pleasant.

The achievements of the Cistercian monks serve to illustrate another aspect of modern ecologic philosophy. As I mentioned before, the swamps in which they established their monasteries were unfit for human life because of insects and malaria. But monastic labor, skill, and intelligence converted these dismal swamps into productive agricultural areas, many of which have become centers of civilization. They demonstrate that transforming of the land, when intelligently carried out, is not destructive but, instead, can be a creative art.

My speaking of medieval times in Europe was not meant to convey the impression that only then have there been great achievements in the management of the land. One need only look at the Pennsylvania Dutch country to see a striking demonstration of land that has been created out of the forest, that became highly productive, and that has been well preserved. One could cite many similar feats all over the world. But the tendency at present is to determine the use of lands and waters, mountains and valleys, only on the basis of short-range economic benefits. And yet one can safely assert that sacrificing ecological principles on the altar of financial advantage is the road to social disaster, let alone esthetic degradation of the countryside. I shall now present a few remarks about how we can create land. By this I mean taking nature as it is presented to us and trying to do with it something which is both suitable for human life and for the health of nature.

To do this it is essential that we identify the best "vocation" for each part of our spaceship. In Latin the word for "vocation" refers to the divine call for a certain kind of function. I wish we could apply this word, and indeed I shall apply it, to the different parts of the earth because each part of the earth has, so to speak, its vocation. It is our role as scientists, humanists, and citizens, and as persons who have a feeling for the earth, to discover the vocation of each part of it.

Certain parts of the earth, like certain persons, may have only one vocation. For example, there may be only one kind of thing that can be done with the Arctic country; there may be only a limited range of things that can be done with certain tropical land. But in practice most places, like most persons, have several vocations, several options, and this indeterminism adds greatly to the richness of life. To illustrate with a few concrete examples what I have in mind, I ask that you consider what has happened to the primeval forest on the temperate parts of the world. I am not going to speak about the tropics. I am only going to speak of western Europe and the United States – the two parts of the world that I know best.

Much of the primeval forest in temperate countries has been transformed into farmland, but what is interesting is that each part of this primeval forest transformed into farmland has acquired its own agricultural specialization, social structure, and esthetic quality. On the other hand, the temperate forest need not become agricultural land. In Scotland and eastern England such lands progressively were transformed into moors – the famous moor country of the Scottish Highlands and eastern England. This happened largely through lumbering activities and also through the sheep grazing of the Benedictine monks. The moors are not very productive from the agricultural point of view, but their charm has enriched the life of Great Britain and played a large part in literature. In North America, much of the primeval forest was transformed into prairie country as a result of the fires set by the preagricultural Indians. The prairies have now been converted in large part into agricultural land, but they have left a lasting imprint on American civilization.

I have quoted a few transformations of the land from one ecological state to another which have been successful, but I hasten to acknowledge that many other such transformations have not been as successful. Much of the country around the Mediterranean has been almost destroyed by erosion, and very little is left of the famous cedars of Lebanon. The transformation from one ecological state to another has given desirable results, especially where it has occurred slowly enough to be compatible with adaptive processes either of a purely biological nature or when it involved the adaptation of man to the new conditions. This is the case for the moors in Great Britain. In this case the creation of romantic moors out of forest land took a thousand years, so there was a chance for all the adjustments that always occur in nature, when there is enough time, to come about. Contrast this with what happened in many parts of the United States where massive and hasty lumbering has been responsible for ghost towns and for eroded land.

From now on most of the transformations of the earth's surface will occur so rapidly that we may often create those terrible situations resulting in erosion and destruction of the land. It therefore is urgent that we develop a new kind of ecological knowledge to enable us to predict the likely consequences of massive technological intervention, and to provide rational guides as substitutes for the spontaneous and empirical adjustments that centuries used to make possible.

I have spoken so far chiefly of the transformations of the forest into new ecological structures that have economic value. But utilitarian considerations are only one aspect of man's relation to the earth. The widespread interest in the preservation of wildlife and primeval scenery is sufficient evidence that man does not live by bread alone and wants to retain some contact with his distant origins. In practice, however, the only chance that most people have to experience and enjoy nature is by coming into contact with its humanized

aspects – cultivated fields, parks, gardens, and human settlements. It is, of course, essential that we save the redwoods, the Everglades, and as much wilderness as possible, but it is equally important that we protect the esthetic quality of our farmland, and to use this image again, that we improve Coney Island.

I wish there were time to discuss at length the factors that make for a beautiful landscape. Clearly, there is a kind of magic splendor and magnitude which give a unique quality to certain landscapes. The Grand Canyon, the Painted Desert, and Niagara Falls are examples of scenery to which man's presence never adds anything, and may detract a great deal. In most cases, however, the quality of the landscape consists, in a sense, of fitness between man and his surroundings. This fitness accounts for most of the charm of ancient settlements, not only in the Old World but in the New World as well. The river villages of the Ivory Coast in Africa, the Mdeiterranean hill towns, the pueblos of the Rio Grande, the village greens of New England, and all the old cities so well organized around peaceful rivers represent many different types of landscapes that derive their quality not so much from topographical or climatic peculiarities as from an intimate association between man and nature.

Among the many factors that play a role in the sense of identification between man and nature, let me just mention in passing how history and climate condition the architecture and the materials of dwellings and churches. Also, how the climate determines the shape and the botany of gardens and parks.

The formal gardens of Italy and France didn't just happen through accidents or through the fancy of some prince or wealthy merchant. These wonderful parks and gardens were successful because they fitted very well into the physical, biological, and social atmosphere of Italy and France at the time of their creation. Such formal parks and gardens also flourished in England, especially during the seventeenth century, but the English school achieved its unique distinction by creating an entirely different kind of park. The great and marvelous English parks of the late seventeenth and eighteenth centureis were characterized, as we all know, by magnificent trees grouped in meadows and vast expanses of lawn. This style was suited to the climate of the British Isles, to the abundance of rain, and to the fact that insolation is sufficiently limited to permit certain types of growth. In France many attempts were made in the eighteenth century to create gardens and parks in the English style. Except in a few cases, however, English-type parks and gardens were not very successful in France.

On this topic, there is an interesting letter of Horace Walpole, who was one of the prophets of the English landscape school. He traveled in France and after his return he expressed a critical opinion of the attmepts to duplicate the English park on the Continent. "The French will never have lawns as good as ours until they have as rotten a climate," he wrote in a letter. This witticism expresses the biological imperatives of the countries in which they develop. This is what Alexander Pope summarized in his famous line, "In everything respect the genius" here express the total characteristics and potentialities of a particular area.

We should have Horace Walpole's phrase in mind when we look at what is being done in our large cities toward creating parks and gardens. Just as the climate in France cannot produce the green magnificence of the English parks, so in general the atmosphere in most of our large cities is unable to support most plant species. This does not mean that plant life is out of place in our cities, only that much more effort should be made to identify and propagate for each particular city the kinds of trees, flowers, and ground cover that can best thrive under its own particular set of climatic and other constraints. When I look on New York City parks and notice how their ordinary grass can appear so pathetic, and when I see how monotonous row after row of plain trees can be. I feel that botanists and foresters should be encouraged to develop other plant species congenial to urban environment. This is a wonderful field for plant ecologists because, in the very near future, pioneers of plant ecology are likely to be much more needed in the city than in the wilderness.

To summarize my remarks, let me restate that the "genius" or the "spirit of the place" is made up of all the physical, biological, social, and historical forces which, taken together, give uniqueness to each locality. This applies not only to the wilderness but also to human settlements – Rome, Paris, London, Hamburg, New York, Chicago, San Francisco – and I have selected these cities as representatives of very different types. Each of these cities has a genius that transcends its geographical location, commercial importance, and population size. The great cities of the world contribute to the richness of the earth by giving it the wonderful diversity that man adds to the diversity of nature. The "genius of the place" will be found in every part of the world if we look for it.

In the final analysis the theology of the earth can be expressed scientifically in the form of an enlarged ecological concept. Since this theology will be formulated by human minds it inevitably will involve man's interplay with nature. We certainly must reject the attitude which asserts that man is the only value of importance and that the rest of nature can be sacrificed to his welfare and whims. But we cannot escape, I believe, an anthropocentric attitude which puts man at the summit of creation while still a part of it. Fortunately, one of the most important consequences of enlightened anthropocentricism is that man cannot effectively manipulate nature without loving nature for her own sake. And here I shall have to summarize a set of comples biological concepts in the form of general and dogmatic statements which, I hope, will convey to you some feeling of what I would have liked to state more scientifically.

It is not just a sentimental platitude to say that the earth is our mother. It is biologically true that the earth bore us and that we endanger ourselves when we desecrate her. The human species had been shaped biologically and mentally by the adaptive responses it has made to the conditions prevailing on the earth when the planet was still undisturbed by human intervention. Man was shaped biologically and mentally while responding to wild nature in the course of his evolution. The earth is our mother not only because she nurtures us now but especially because our biological and mental being has emerged from her, from our responses to her stimuli.

Furthermore, the earth is our mother in more than an evolutionary sense. In the course of our individual development from conception to death, our whole being is constantly influenced by the stimuli that reach us from the environment. In other words we constantly are being modified by the stimuli that reach us from nature and also from what we have done to the earth. To a great extent, we therefore come to reflect what we create. I shall restate here a phrase of Winston Churchill's that I quoted two years ago in this very room:

"We shape our buildings and afterward our buildings shape us."

This means that everything we create, good and bad, affects our development and, more importantly, affects the development of children. In his notes of a Native Son James Baldwin expressed even more vividly the influence of our environment on our biological and mental characteristics. Here are three phrases:

"We cannot escape our origins however hard we try, those origins which contain the key, could we but find it, to all that we later become."

"It means something to live where one sees space and sky, or to live where one sees nothing but rubble or nothing but high buildings."

"We take our shape within and against that cage of reality bequeathed us at our birth."

In the light of the remarks that I have presented to you, I have come to a sort of general philosophy about the meaning of the word "conservation"; and it is with a brief statement of this philosophy that I end my presentation. Conservation programs, whether for wilderness or for man-made environments, usually are formulated and conducted as if their only concern were to the human species and its welfare. Yet they can be effective only if they incorporate another dimension, namely, the earth and her welfare. This is not sentimentality but hard biological science. Man and the earth are two complementary components of an indivisible system. Each shapes the other in a wonderfully creative symbiotic and cybernetic complex. The theology of the earth has a scientific basis in the simple fact that man emerged from the earth and then acquired the ability to modify it and shape it, thus determining the evolution of his own future social life through a continuous act of creation.

THE ULTIMATE SOCIAL REVOLUTION!

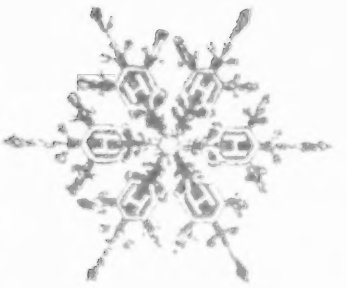
'The three-day week is where we're headed'

"With the four-day week you can get away from the world, and get to know yourself again," muses Wally Hoare on a crisp Friday morning, as he flicks his line across the dark surface of a trout pool, deep in the leafy solitude of the New Hampshire woods. "Of course," he adds, "if they would cut it down to three, it would be even better. "Most Americans, caught up in the busy five-day work week, would gladly settle for one extra day off. But economic theorist Millard Faught believes that the three-day work week actually makes the best economic sense of all. With the week divided into two three-day shifts of 10 hours a day, argues Faught, industries like steel and autos would be able to use their costly equipment far more efficiently than they do now, and their increased profits would far outweigh the extra labor costs.

At the same time, the three day week would leave workers with a really significant stretch of free time each week. Faught foresees a time when millions of workers will escape from the cities into the country, commute once a week to their three-day jobs, spend two nights in town and return to their families for the rest of the week. "The four-day week is just a way station," Faught predicts. "The three-day week is where we're headed."

– quotes of Dr. Millard Faught in LIFE Magazine ©copyright 1971, TIME, INC.

Cultural Policy - A Modern Dilemma



By Frank McDermott

(At an unprecedented UNESCO conference in Venice, August 24-September 2, 1970, 88 nations debated the problems of cultural policy in a post-colonial world. Reprinted from the UNESCO COURIER, Sandy Koffler, Editor)

The four bronze horses that for centuries have watched over the fluctuating fortunes of the Serene Republic with the same impassive stare may be forgiven if, on August 24 last year, they greeted to arrival of the delegates to Unesco's Intergovernmental Conference on Administrative, Institutional and Financial Aspects of Cultural Policies, with collective bewilderment.

Themselves the magnificent fruit of a Greek artist's inspiration, they had in the past been acquired successively by Nero, Trajan, Constantine, the Doge of Venice and Napoleon to glorify personal military achievements. Could the men of today be expected to understand the purpose of the creative artist and the meaning of a work of art any better than their predecessors? Horses don't bet on people, and in this case they would have found no takers.

Yet when this first international conference on cultural policies was over it had tolled the knell of the selfconfessed philistine and the "culture vulture" alike.

Delegates from almost ninety countries, including 39 Ministers, perhaps inspired by the magnificent backdrop that Venice provided for their deliberations, publicly and unreservedly reaffirmed that "Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits." But more than this, they showed, once and for all, their resolve to make this extract from the Universal Declaration of Human Rights a reality of modern life.

Differences as to the means to achieve this became evident as the conference progressed, but never once did these differences blunt the edge of determination and faith or deteriorate into a destructive negativism. Instead they offered a foundation on which to go on building.

There was, for example, general agreement with the basic proposition that every country should in fact have a cultural policy. As Unesco's Director-General, Rene Maheu, pointed out with unassailable logic, "If everyone, as an essential part of his dignity as a man, has a right to share in the cultural heritage and cultural activities of the community,. . . it follows that the authorities responsible for these communities have a duty, so far as their resources permit, to provide him with the means for such participation."

Many countries already have clearly defined cultural policies and machinery for carrying them out. Some have appointed Ministers of Culture or allotted responsibility for cultural policy to government departments with complementary duties.

In certain countries, the danger of stifling artistic creativity under a bureaucratic blanket was felt to outweight the advantages of direct government intervention. This is not to say that such countries reject the idea of a cultural policy. On the contrary, it is often a deliberate policy to encourage non-governmental bodies and individuals to provide the motivating force.

The crux of the argument then was about the degree of government intervention that was desirable.

The Moroccan Minister of Culture, Mr. M. El Fasi, explained how governmental intervention was viewed in his country by quoting from a speech made by King Hassan II in 1969:

"We wish to bring together activities which were formerly dispersed and co-ordinate them. We have accordingly set up a Ministry to deal expecially with them, to get our people to realize how valuable this knowledge is, how its originality is constantly renewed, and how valuable a national heritage it represents."

The Soviet Minister of Culture, Madame Ekaterina Furtseva, explained that culture was inextricably bound up with all the other activities of a nation. "The cultural development of a nation," said Madame Furtseva, "depends upon the socio-economic basis of society, on people's material welfare; at the same time, the cultural development of the masses is an essential condition of social and spiritual progress. "

the principle upon which Soviet cultural policy has been based since the Revolution in 1917, when three-quarters of the population was illiterate and over forty nationalities inhabiting outlying areas did not even have a written language. From the outset, the State assumed responsibility for all organizational, material and financial aspects of the development of culture and art.

Long-term planning was essential. "To realize the importance of long-term planning." said Madame Furtseva, 'one has only to think how life is likely to have changed, not only in 15 to 20 years, but even in 10."

The dangers of concentrating patronage "in the hands of a limited circle of politicians, bureaucrats and artists' union bosses" were pointed out by the Norwegian delegate, Minister of Education Mr. Kjell Bondevik, who recalled the old adage that "he who pays the piper calls the tune."

Clearly this was an aspect of the problem that worried a number of delegates. A cultural policy requires a fine balance, but must enhance rather than encroach upon the artist's creative freedom.

As the Yugoslav Minister of Culture, Mr. V. Micunovic, pointed out, "The freedom to create cannot be granted or withheld by decree, but a State can provide the social and legal conditions which allow an artist to express himself fully and to express the whole complexity of his personality."

In a frank statement Mr. Micunovic declared that "State interference in aesthetic matters, characteristic of the first post-war years, impoverished culture and weakened creative criticism."

Cultural policy should be concerned with the social and legal security of the artist, with providing the material conditions which allow cultural and artistic institutions to operate, with satisfying the needs of art and the need for art. The Yugoslav constitution safeguards the independence and autonomy of artists and scientists, limits the say of public authorities in deciding what shall be accepted as culture and eliminates the State's right of arbitrary judgment on the artistic value or otherwise of what artists produce.

"Contrary to what is happening in other countries." said Mr. Micunovic, "the role of the State and of governmental bodies in the direction of cultural affairs in Yugoslavia is likely to decrease; to an increasing extent, it will become merely supervisory. The decisions will be taken where decision-making properly belongs, if democracy is to be taken in its literal sense, by the people actually doing the work or those they choose to represent them; by those who create forms of culture and by those for whom it is intended."

Recent moves by governments to recognize on a national, public basis the importance of the arts and humanities to the future of their societies were recalled by Miss Nancy Hanks, Chairman of the U.S. National Council for the Arts. In the United States cultural matters have traditionally been considered to be of solely private concern. "Public money spent on cultural matters other than education," said Miss Hanks, "will perhaps always be relatively small as compared in absolute terms with funds for health, welfare, economic development or the sciences; but now we have a commitment to an idea.

Mr. Edmond Michelet, the French Minister of Culture (who died shortly after the conference), pointed out that it has taken a long time for the idea to grow that culture, regardless of how it may be defined, is the private property of no one; and once it was recognized as essential to man's dignity, all the barriers had to come down. "But," said Mr. Michelet, "it is beyond the power of individuals or groups, however generous, to handle problems that involve millions of people."

The conference, therefore, whilst admitting the importance of governmental cultural policies, was less united on the question of the extent of State action required and the institutions and machinery needed. "The degree of direct governmental involvement." states its final report. "depends upon the socio-economic system, the ideological character and the degree of economic and technological development of the country concerned. It is, therefore, not possible to recommend any standard structure applicable in all countries."

CHANGING WAYS OF LIFE AND THE STRUGGLE FOR CULTURAL IDENTITY

Like alchemists seeking the philosopher's stone, a number of delegates at Unesco's Venice conference made brave and elegant attempts to define culture. Others obliquely skirted the issue, and Lord Eccles, the United Kingdom Minister responsible for the Arts, admitted unashamedly, "In my country we have no clear idea what culture means. Indeed, the English – I dare not speak for the Scots or the Welsh – are reluctant to admit that they have any such thing as a national culture."

The conference refrained from the time-consuming effort of finding a definition that would satisfy all viewpoints. It kept resolutely to its task of discussing the problems involved in creating cultural policies, yet from the fire of debate a surprisingly clear picture emerged of what culture meant to the delegates, even if this defied formal expression.

This was particularly noticeable in the statements of delegates from the developing countries. Again and again culture was referred to as a unifying force, a democratizing influence and the expression of personal and national identity.

The Zambian delegate, Mr. J.L.M. Mulenga, summed up the feeling about the search for a national identity when he quoted a message from President Kaunda addressed to the 1969 National Arts Festival: "We can never hope to build a nation if we are not united by a common culture. Citizens of any country cannot all think alike, even members of the same family can have violently diversive views, but there is always something that unites them, and that is, that they share a common culture."

Mr. Mehrdad Pahlbod, Minister of Culture and the Arts of Iran, declared culture to be "the only element capable of imparting to men the sense of personal identity without which all communities are laid open to alienation and disintegration. Long considered a luxury, culture is generally understood today as being essential for social and economic development."

Although emphasis in the States emerging from long periods of colonial rule has been primarily on grappling with the basic material needs of the people, hunger of another kind has also been demanding attention. As Mr. C. Cherif of Guinea put it, there is "nothing retrograde about reviving a national culture. It gives a country back its soul and its moral equilibrium and prepares it to absorb what progress can contribute without being absorbed by it.::

The dilemma facing many newly independent States was neatly explained by Minister of State, Mr. Hector Wynter of Jamaica. As a result of the colonial educational structure, "it is natural to find that, to the better-off and better educated, culture means only European culture with its treasures of music, painting and the arts. Increasing access will therfore – dare I say it – amount to cultural colonization.

"We have had to engage in aggressive policy of discovery and identification of our cultural heritage and an equally aggressive policy of conservation, creation and dissemination to avoid having to seek an identity elsewhere. It is right to provide access to the admittedly great European culture which is part of our heritage, but it is equally necessary to seek out the great culture patterns of the African and Asian heritage which are a part of our patrimony."

The problem does not present itself in the same way in all the developing countries. Too rich an inheritance from the past can be a crushing burden on limited resources and be stultifying for new cultural development.

Mr. Habib Boulares, Tunisian Minister of Culture and Information, drew a vivid picture of his country faced with the dilemma of preserving and restoring an embarrassingly rich legacy from the past whilst striving to catch up with and enter the mainstream of modern life. This indeed is a delicate task for the government which must make choices, provide finance, encourage and promote.

"But," continued Mr. Boulares, "the public authorities must know what they are trying to do. In a country like Tunisia it is difficult even to say what the expression "national culture" means, since it includes Berber, Punic, Roman, Oriental, Arab, Berber-Arab, Ottoman-Turk, Moslem.

"In a country which has successively seen seven languages and seven different cultures, and in which a score of political regimes have done their utmost to reduce the indigenous population to the rank of second-class inhabitants and destroy even the memory of their predecessors, "national culture" is scarcely an adequate term to use.

"Assuming that it were possible at all, what an effort it would take to bring all the elements of this heritage to light and introduce them into curricula and other cultural activities so as to make them available to all."

Mr. Boulares pointed to the Tunis-Carthage project, being undertaken in collaboration with Unesco, with its twin cultural and economic aims as being a prototype which might well provide a new approach during the next Development Decade. (See the December 1970 issue of the "Unesco Courier" which was entirely devoted to the Tunis-Carthage Project.)

Speaking to the press after the conference, the Secretary-General of the meeting and Director of Unesco's Department of Culture, Mr. Amadou Seydou of the Niger, showed how closely his finger had been on the pulse of the discussion in an admirably concise analysis of the many statements given from the view-point of the developing nations.

The biggest and most immediate problem for the developing countries, Mr. Seydou pointed out, was that many of them, particularly in Africa, had almost entirely oral cultures and traditions.

Preserving and developing their cultures was a matter of urgent action today. In Niger, for example, a centre had been set up, with Unesco's help, with the task of making tape-recordings of traditional songs, myths and fables, religious rites, and so on, before the older human repositories of the ancient traditions died out. Material assistance in the form of tape-recorders and film-making equipment was wanted desperately and was wanted now. "The crisis in the advanced countries," said Mr. Seydou, "is to decide what is the meaning and purpose of culture. Their problem is how to make proper use of the mass media; for the developing countries the problem is to get hold of them."

It was natural that the developing countries should wish to protect their national cultures from being swamped by Western ideas and traditions. "Cultures are ethnocentric," said Mr. Seydou, but they must not become totally isolated. The developing countries had to avoid the error of allowing cultural protection to develop into cultural protectionism.

For the developing nations then, cultural policy must provide the thread by means of which their peoples can find their way through the labyrinth of history towards national consciousness and identity. To quote Mr. Boulares of Tunisia once more, "To live only on borrowed culture is like living someone else's life! "To live on a culture borrowed from the past is like cutting oneself off from life. A synthesis is necessary. It must be made in an atmosphere of freedom and, in the last analysis, it is a matter for each individual."

In the words of the English writer Thomas Carlyle: "The great law of culture is: Let each become all that he was created capable of becoming." This is clearly what the delegates hope to see made possible for their peoples both as nations and as individuals.

The Venice Conference, while unanimous in accepting the principle of each man's right to culture and on the need for at least some government action to ensure this right, was far from reaching agreement on how to deal with the powerful new force that mass culture represents.

A new urgency, tinged with a certain acrimony, marked this stage of the discussions.

What was this danger that seemed to be threatening notonly the conference but also a culture-hungry world?

The delegates were certainly not afraid of the effects of mass culture itself. They would have shouted down Epicurus who, may centuries ago in a letter to Pythocles, wrote: "Hoist all sail, my dear boy, and steer clear of culture."

Some delegates saw the principal danger in excessive government interference, whilst for other the mass media were cast as the villain of the piece. In other words the risks lay with the means and methods used to make the world's inheritance of culture available to its three and a half thousand million heirs. The problem was to steer a safe course between the Scylla of propaganda and the Charybdis of tribiality.

For the soviet Minister of Culture, Madame Ekaterina Furtseva, the battle had already been brought to a largely successful conclusion in the U.S.S.R. For her, governmental intervention was no threat but a sine qua non of an effective cultural policy.

Madame Furtseva pointed an accusing finger at commercialism and its distorting effect on art for the masses.

"I think the time has come," said Madame Furtseva, "to make use of the social rights and duties of Unesco and its Executive Board, and to ban the dissemination by the modern mass media of so-called commercial art, which runs counter to the principles of humanism and

helps foster a cult of war, violence and racialism, crime, pornography and brutality. We must not let the pseudo-heroes of this ersatz culture replace for our young contemporaries the eternal beauty of art dignified by such glorious names as Raphael, Shakespeare, Beethoven and Tolstoy."

Some echoes of this fear of commercialism were evident in the speech of the chief delegate from Sudan, Mr. H.A. Yousif, although the problems for his country are vastly different from those of the Soviet Union:

"In a society which is more and more divorced from rural life, increasingly oriented towards urban life, moving from a purely ascetic towards a more secular life, from an agricultural economy towards an industrial one, many cultural problems arise; and family disintegration, social and moral irresponsibility, crude tastes in humour, a more liberal view of sex, and an acquaintance with the superficial aspects of Western civilization, all tend to create a cultural vacuum. There is a danger of rejecting old roads without discovering new ones."

Such a notion of a "cultural vacuum" and the danger that it would be filled by an inferior, pseudo culture born of a marriage of convenience between technology and commercialism seemed to be a nagging anxiety that lay at the back of many delegates' minds.

The chief Mexican delegate, Dr. J.L. Martineze summed up this feeling. "Culture," he said, "has recently acquired a completely new role; that of providing a shock-absorber in a technological world, and particularly in cities... Industry and technology are already producing a lethal smog in cities. A complete lack of balance in education is producing students, studying for technical careers, who do not even know the rudiments of their own language and have no interest in or knowledge of anything outside their subjects. From that point of view, technology is responsible for a mental smog that could be similarly lethal to any kind of worthwhile civilization."

Dr. Martinez was well aware, however, that technology, or the ill-use that men made of this potent weapon, was not the only menance. In interventions in cultural affairs governments had to walk a tightrope.

"It is sometimes difficult," said Dr. Martinez, "for the State to maintain the freedom to think and create and at the same time ensure the participation of writers and artists in economic and social life. Nevertheless, criticism and contestation are a necessary ferment for the health of peoples and indispensalbe to social change and even to progress. It should never be forgotten that many of our patriots and great cultural figures were dissidents or revolutionaries in their day."

The impact of the scientific revolution of the post-war years and its effect on cultural development was never far from the delegates' thoughts. How great an effect for good the advances in telecommunications can have becomes clear when we realize that a single televised broadcast of say Mozart's opera "The Magic Flute" probably reaches a greater audience than the sum of all previous performances in opera houses throughout the world since the work was written.

The counterbalancing evil effect is that, with a transistor or a television set in almost every home, the demand for programmes of quality has become enormous and the gaps are too often filled with endless outpourings of a kind of "musical chewing-gum" liable to turn us all into undiscerning ruminants.

As Lord Eccles pointed out we are now all exposed to a much more powerful distribution of art than any preceding generation. "No small body of professionals and experts," he said, "now has the privilege of making the occasional effort to bring art to the deprived masses. They have art brought to them in their homes, they listen to the radio in their automobiles, and while they are at work soporific music is relayed to them by loudspeakers.

"This is an entirely new world of communications in which the urgent task is to raise the quality of the art which is being provided, day in and day out, for everybody. We have little time to lose because, before long, the mass media may have blanketed whole populations either with the trivialities of the consumer society or with political propaganda, and I do not know which is worse for the character of the individuals who make up these vast audiences." If Lord Eccles was aware of the dangers that lined the way towards the establishment of effective cultural policies, he was far from pessimistic about the future and had the air of a man convinced that if the dangers were squarely faced they could be overcome.

He recommended that national cultures should be made available in such a way as to add to the enjoyment and instruction of pouplations as a whole; that governments should be asked to give artists the greatest possible help, both by direct government subsidies and by the encouragement of private partronage; that an intensive study should be made of the relations between the live arts and the mass media and that copoperation between them should be increased, remembering that "the mass media are now the most powerful instruments for raising or debasing the cultures of tomorrow."

Throughout the conference there was an evident desire to avoid useless ideological confrontations and at

the same time a desire to hear and interpret constructively the other man's point of view. Debate left the conference united on a wide range of things to be done rather than fragmented into angry factions that expostulated but did nothing.

Dare we hope that this is a sign that the cultured man is the constructive man, that this conference marks the beginning of a new age of reasonableness and constructive cooperation? Clearly the delegates felt that it did and even the most cynical of observers could not help but catch a little of their infectious optimism.

The closing stages of the Conference found the delegates "full of great aims and bent on bold emprise." A flood of draft resolutions, 80 in all, bore witness to the urgent wish for words to be translated into actions.

Some measure of the agreement reached during debate became evident when these 80 draft resolutions were whittled down to 24 recommendations.

A striking feature of these recommendations was that fully half of them were addressed to the Member States of Unesco themselves. The conference was clearly anxious to underline the fact that culture is not a "spectator sport" to be left to professionals and international organizations while the world as a whole looks on ready to cheer or boo, but a "do it yourself" activity in which everyone should take part.

This does not mean that the conference underestimated the role that the Secretariat of Unesco might play. Indeed it placed heavy emphasis on the need for international co-operation, co-ordinated by Unesco.

Without attempting to give a complete list, some of the conference's major recommendations on which action can be expected within the next few years must be mentioned.

The delegates called for: the creation of a centre for the exchange of information on cultural policies which would work, not only in collaboration with governments, but also with foundations interested in the arts; the preparation of cultural statistics models; research on the cultural content of formal and lifelong education; research into the cultural effects of the new audio-visual methods; cooperation with other United Nations organizations in drawing up international agreements to ensure that, in the use of telecommunications satellites and other new media, the equality of cultures and non-interference in the internal affairs of States will be respected.

The delegates were aware that cultural activities require advisers, "animateurs" and other organizers and administrators, and called on Unesco to make provision for their training.

Recognizing that cultural development is part and parcel of development generally, the conference recommended that Unesco make a study of the relationship between cultural and general development and the possibility of creating an international fund for cultural development.

Finally, encouraged perhaps by the success of their own deliberations, the delegates called for a further successinon of intergovernmental conferences and meetings in Europe, in 1972, Asia, in 1973, and Africa, in 1975, and an international symposium of creative artists and men of culture on the contribution of culture to humanism and peace.

Underlying all these recommendations was the firm, unquestioned assumption that culture will be a major issue of the 1970s and that, in one way or another, government involvement is an established fact.

In presenting his report on the Venice Conference to the General Conference of Unesco, the Director-General stressed the importance of the delegates' findings. He proposed certain possible re-arrangements in the draft budget for 1971/72 to permit immediate action on at least some of the recommendations from Venice.

The Venice Conference has attempted to remind the world of the basic needs of human existence. Man has been trying for years to live by bread alone and has found it an exceedingly indigestible diet.

If it is a little unfair to cast Science and Education as the Ugly Sisters, Culture has certainly been for too long the Cinderella of development. Like so many fairy-godmothers, the delegates at the Venice Conference tried to work their magic. Will the rags-to-riches story have a happy ending? We shall have to wait to see whether that fickle Prince Charming, would opinion, has the courage to claim the prize.

THE THOUSAND AND ONE FACETS OF CULTURE

(A selection of views of Delegates to the UNESCO Venice Conference)

THE THOUSAND AND ONE FACETS OF CULTURE

Morocco

When the first man used a gourd, or something like it, to take up water for a drink, that was utilitarian. It was still utilitarian when he tried to fashion a bowl out of clay, in imitation of the gourd. But his purpose in attempting to decorate this bowl was no longer utilitarian; it was the response to a deep aspiration for beauty which is the specific attribute of culture.

Mohammed El Fasi
Minister of Culture

Hungary

A good cultural policy should give culture to a wider public and give the artist freedom to create – that was what the Hungarian poet Sandor Petofi had in mind a century and a half ago in writing of the ray of sunshine of the spirit shining on the windows of all the houses.

Pal Ilku
Minister of Culture

France

It must be admitted that it is difficult not to believe that one's own culture is the best that exists, or understand that a wholly different way of thinking may be exactly what someone else needs. But we should encourage everything that is authentically human in every civilization. France is prepared to help any country which asks, in making an inventory of its riches and in making its culture better known inside and outside its own frontiers.

Edmond Michelet
Minister of Culture

Somalia

Culture is a way of life chosen or adopted by a society or group of societies. It amounts to the sum of traditional values and way of thinking of the society.

Mohamed Seck Hassan
Director-General, Ministry of Education

Australia

Culture must not be too narrowly conceived. Indeed, properly, it comprehends much that lends quality to life and, in one sense, it can be seen as a desirable component to all aspects of living. Thus in Australia the natural environment of an ancient continent, a wild-life rich and strange, and a certainty of sunshine have traditionally established open-air activities and the artistry of sports as integral parts of our way of life and of our national culture. There is, of course, classical justification for this view in the example of ancient Greece.

We must be careful too not to impose narrow ethnic limits on the content of culture. In our own case migrants to our shores have brought us a better appreciation of the complexity of European culture, and increasing contact is bringing the influence of the richness and vitality of the manifold cultures of Asia to bear upon the minds and imagination of our artist. Perhaps, most importantly, we have come better to understand and to value the unique art and culture of the aboriginal Australians.

Nigel Bowen
Minister for Education and Science

Irag

Culture is the collective intellectual achievement of a people and the embodiment of their values, their aspirations and their way of life.

Saad Abdulbaki
Minister of Education

World Federation of Trade Unions

To working men, culture is not only art and letters, although they appreciate the full intrinsic value of these without always having access to them; and culture would amount to little if it were merely decorative and escapist. Culture must be comprehensive, including all the sciences and technologies, the arts, sport, and the indispensable social culture – economic, trade union,

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political – forming an indissoluble whole, each influencing all the others.

. . . One autumn day, Jaures was walking through a forest and met a woman with a load on her back. He greeted her and remarked on how beautiful everything was around. "If you would help me to get this wood off my back," she said, "I could look up at the trees and see if it really is."

Maurice Gastaud
World Federation of Trade Unions

Mexico

What we want is that, once freed from immediate necessity, protected and free, educated and healthy, man should be fully human i.e., be able to use his judgement, to imagine, to meditate, and to dream.

Jose Luis Martinez
Director-General of the National Institute of Fine Arts

The Holy See

The State is "paid" less tengible for the cultural facilities it provides than for others which are more material, and is sometimes paid with ingratitude. And still, this wider, more flexible, more disinterested part of what it does should not discourage it from working for cultural development as an integral part of development as a whole.

Mgr. Andre-Jacques Fougerat
Adviser to the State Secretariat

Guyana

In the smaller and weaker States, one purpose of cultural policy must be to achieve a greater resistance to the onslaught of the twentieth century without at the same time encouraging the growth of inhibiting parochial timidity.

M.W. Carter
Minister of Information and Culture

Iran

Culture is a way of interpreting the world. Science is a way of transforming it. That is not sufficient reason for keeping them separate. In so far as science is a culture, it should be integrated, and one of the primordial tasks of cultural policy is to ensure that integration. And, as cultural policy is a matter for individual governUnesco must endeavour to provide the world co-operation which offers the only way of bridging the over-growing scientific gap between the advanced and the developing countries.

Mehrdad Pahlbod
Minister of Culture and the Arts

Guinea

Mass culture is essentially different from elite culture but in no wise inferior to it. It is a potentially explosive creative force which could be compared to its advantage with the individualist subjectivity carried to its extreme by certain intellectuals and artists who, seeking a new language, had reached total incommunicability or, at best, a code language that strangely recalls that of the most occult sects. Culture and witchcraft are surely different things. . . .

Cheick Cherif
Consul-General for Guinea in Berlin

Denmark

There is probably no society on the face of the earth that does not have to neglect vitally humanitarian and cultural problems because of what is spends on armanents. At the same time as technological progress follows a vertically ascending curve, we are all thinking on horizontal levels; the technological revolution has not been accompanied by a revolution in our ways of thinking.

C. Helveg Petersen
Minister for Cultural Affairs

Togo

A number of paradoxes merit reflection. Culture has never been as rich and yet, never so much called in question. Culture has never been as universal and yet never so torn apart internally. Culture has never spread so widely and yet never been so much in danger of losing its central purpose: man. Culture has never had so many material and technical aids available to it for its conservation, and yet has never been so totally menaced with extermination. For, looking at the apocalyptic pictures in the museum at Hiroshima, I could not help thinking to myself: the whole world could be like this tomorrow, and not only that, but there would not be even one spectator left to come and remember our sestruction.

N'Sougan Ferdinand Agblemagnon
Permanent Delegate to Unesco

Sweden

To the younger generations, cultural isolation, like other forms of national isolation, seems not merely unrealistic, it seems absurd. The fact of artists being forced or induced to create an underground civilization can only be taken as a symptom of serious sickness in the political structure. Art is not merely a social product; it is also an instrument for changing society. Artists must be free to use their own means of expression. History has left us many examples of how reality sooner or later – often in the most drastic way – takes its revenge on those who deny the artist the freedom to follow his own calling.

Sven Moberg
Minister of Education

Federal Republic of Germany

In a deliberate move away from the appalling experience with absolute State power, the Federal Republic of Germany limits itself to aiding and promoting, without preconditions or compulsion. The task falling to the State, and indeed the community, is to protect human values and human dignity. Art, in the words of Camus, can only live under its own laws; it dies when exposed to external demands. Administration and culture can go together only on the understanding that intellectual creative activity shall be free. And a culture which takes shelter behind its national boundaries must necessarily decay.

Bernhard Vogel
President of the Permanent Conference of Ministers of Education and Cultural Affairs of the Lander

Spain

Planning means establishing an order of priorities i.e. a scale of values. But even assuming that there are unchanging models and an artistic golden rule (which seems to be more and more unlikely), there remains the major problem of the renewal of patterns, types, styles, ways of life; and the risk of fossilization which the administrators run immediately becomes apparent. There are questions to taste and fashion which cultural policy has only to touch incidently upon to provoke, on both sides, misunderstandings, interference, refusals, reticence. This becomes all the more serious because the modern State, if it is unable to indoctrinate artists, can perfectly well – even without wishing to do so – orientate, influence, condition public taste; and private and commercial interests do so deliberately and without scruple.

This does seem to be inherent in culture: to be condemned to devour or to be devoured and, in this sense, all countries without exception are invaders or invaded. But things are even more complicated. To a certain extent every culture devours itself: in a kind of cultural cannibalism, innovations in style, type or taste, to feel sure of themselves, have to destroy their predecessors.

Emilio Garrigues
Permanent Delegate to Unesco

Italy

We hope, in the present and future history of mankind, never again to have to regret the humiliations and absences caused by the repressive intervention of the State against freedom of thought and freedom in art.

Vittorino Veronese
Former Director-General of Unesco

Cameroon

Can anyone imagine the African peoples flourishing without music, without dancing, without masks and statues, without the immense verbal wisdom bequeathed by generations of thought, and without the legendary joy of our tribes? But how can this art be preserved against the assult of the modern world unless artists are given the means and techniques to express themselves in the style of their times, confidently and with dignity, and still be perfectly authentic? Excepting with the help of the public authorities, how else can this be done?

Too many bilateral and even multilateral agreements exclude cultural matters or regard them as superfluous luxury.

Zache Mongo Soo
Minister of Education, Youth and Culture

Belgium

The year 2000 is only thirty years away. It will probably contain 140 working days. Education should not forget the remaining 225.

Universal education is becoming a reality but will take its full effect only in future generations. For the moment, probably not more than a tenth of all adults lead a conscious and active cultural life. This is partly because their education has been based too exclusively on a mere transfer of knowledge and on having to learn a

bit about everything. At the age of 19, a boy or girl ought to know about theatres, concerts, libraries, museums. The sad fact is that they often do not. Some people are satisfied with their days off, their paid holidays, their sports matches and their television. Even those who do not want to work are supported by the State, and some students, drop-outs, hippies and beatniks see no reason for continuing the material struggle for existence.

The other extreme is represented by people who work themselves to death in order to gain more and more of the products of a consumer society.

How is this challenge of the welfare society to be met?

Some surveys have revealed that 70 per cent of those who started work between the ages of 14 and 18 never followed another course of any kind. They obviously need properly thought-out facilities for education, in and out of school. Otherwise, it is difficult to see how there can be any democratization of culture.

Frans Van Mechelen
Minister of Dutch Culture

Colombia

The Bank of the Republic of Columbia has been called "the bank with a soul." To it is due the Museo del Oro, in Bogota, which has an impressive collection of pre-Columbian gold objects, a regular El Dorado of the archaeologists; the numismatic museum; the "Cathedral of Salt" at the Zipaguira mines; and a centre for youth and artists. . .

Jose Manuel Rivas-Sacconi
Director of the "Caro y Cuervo" Institute, Bogota

Japan

I should like to refer to what might be called the intermediat arts that are widespread among the Japanese people and vary between highly sophisticated art and popular amusements: the tea ceremony; flower arrangements, and the writing of the short poem known as "Tanka" and "Haiku". Over twenty million people are learning how to sip a cup of tea with formal and refined manners, how to enjoy the making of formal flower arrangements in their homes, how to write verse.

Two kinds of art and culture of different origin, European and Japanese, can now be regarded in Japan as like the two wheels of a cart, and have brought incomparable variety to our lives.

Kenji Adachi
Deputy-Commissioner, Agency for Cultural Affairs

India

Culture will have to have a vast base for survival in the modern world. And youth cannot be forgotten when thinking of the masses. States rarely provide adequately for their needs. Much of the present-day ills of youth can perhaps be traced to culture starvation, or what one might perhaps call cultural illiteracy.

We in India would not like the development of culture to be equated with the development of arts, especially literary, performing or plastic arts. We believe that through culture, a hierarchy of values can be established in the mind of the individual. Indeed, this is the message of traditional cultures, especially the culture of India. At no point of the history of India was there any doubt regarding the ultimate goal of life – not in making man as comfortable as possible, but in making him aware of his immense possibilities for spiritual development.

Indian tradition stresses the need to develop the harmonious man who, says the Bhagavad Gita, does not cause disharmony in the world, nor does the world cause disharmony in him.

T. R. Jayaraman
Joint Secretary, Ministry of Education and Youth Services

Netherlands

Social security marks a major step forward, as also have compulsory education and paid holidays. Modern development would be pointless without making the same sort of progress in cultural matters. Are the public authorities then entitled to exert pressure and influence, as Orpheus tried to influence the destiny of Eurydice by descending to the underworld? The answer is evidently: no.

The mass media have their advantages and their drawbacks. We must live with both. We must encourage the greatest creativity of the greatest number – and this is obviously a matter for the public authorities – unless we want passive receptivity to win; if it does, the spectators will have given in, accepting this culture, wrapped and labelled like a pharmaceutical product.

The industralized countries are certainly more cut off from creative sources than countries less well off materially. Where the sources have dried up, they must be renewed. This requires a new type of organizer, who is not an educator in the formal sense, or a psychoanalyst, and still less a sergeant-major. He must be both fellow-player and guide. Part of his role in continuing education is to rid people of the idea that, however

successful they may be in economic matters, art and cultural activities are beyond them.

Marga Klompe
Minister of Culture

Switzerland

The Swiss Confederation has four languages and three cultures, and firmly believes in the peaceful coexistence and mutual enrichment of its various languages, religions and cultures – cultures linking us to the three neighbouring countries with whom we share them but without prejudice to our own cultural autonomy.

Willy Spuhler
Former President of the Swiss Confederation

Yugoslavia

Yugoslavia is a country with two alphabets, three religions, five nations, six republics and several nationalities.

Vukasin Micunovic
President of the Federal Council for Education and Culture

Bulgaria

The acclaim won by the superficial is always short-lived and never, finally, evokes a real social response. The democratization of culture in Bulgaria has never been interpreted as simplification, as draining works of art of their real content.

Pavel Matev
President of the Committee for Culture and the Arts

PERSPECTIVE

"Humour is odd, grotesque, and wild,
Only by affection spoil'd;
'Tis never by invention got,
Men have it when they know it not."

– Jonathan Swift
1667-1745

TODAY'S HUMOR A WEAPON THAT KILLS ALL FEELING

By Clifton Fadiman

The perception of the funny is affected by time, place, age, class, race and other conditioners. While in some form it has been almost universally identifiable as part of the human makeup, nothing precludes the possibility of its gradual degeneration to bestigial form.

In its social or folk aspect, humor may reveal certain permanencies. The amusement occasioned by physical discomfiture (the slip of the banana peel) seems universal and timelss. In its artistic aspect, humor tends toward the transitory.

Its most salient characteristic is its tendency to date. That is why it takes a scholar to laugh at the so-called classics of humor: Aristophanes, Rabelias, Cervantes. It also explains why, as time passes, such classics tend to be read less as sources of amusement than as works of serious art, reflecting a general rather than a narrowly humorous view of life, even though the desire to entertain may have been the dominant original aim. The humorous scenes of Shakespeare today strike all (except those with a vested academic interest in the Bard) as remote or even painful. Once thought of primarily as a humorist, Mark Twain is today viewed in quite a different light.

Datedness is even more apparent in the work, however fine, of professional humorists. No one who has laughter as his main objective can today read the once highly entertaining Jerome K. Jerome. In 20 years no one will be able to read Benchley or Thurber, except as good examples of the humorous styles of their period.

So, while all humor has a high obsolescence rate, in a technological society dedicated to the wholesale production and near-instantaneous dissemination of all signals, the rate is abnormally intensified. This is true of all cultural forms, but the absolescence rate of humor would seem to outstrip that of other literary forms.

It is the proper and necessary function of communications technology to reduce or kill all feeling by embodying it in signals that are mechanically produced and frivolously or stuporously perceived. Thus all contemporary propaganda begins in genuine feeling and ends in show business, and the elapsed time between the two is becoming shorter and shorter.

In 1850 a good joke might have had a life expectancy of a century, and among the more respectable classes in England this may still be true. But in general today a good joke, or any item of humor, approaches a life expectancy limit of zero. That is why the blackouts and gags of "Laugh-In" are so proper to our time: they must be perceived and forgotten almost instantaneously. But can a humor of near-absolute ephemerality qualify as humor in the accepted sense?

No More Eccentrics

English and American humor have been traditionally linked with individuality, indeed eccentricity: Falstaff, Uncle Toby, Micawber, Chaplin. It is more natural (to us) to think of humor as associated with the discrete personality than as associated with mass, class, or race. But a technological society, aiming at the reduction and eventual elimination of the coefficient of friction, cannot tolerate the discrete personality, and especially the eccentric one. It nullifies him, mainly in two ways.

The first way is to reward the normal or predictable (B. F. Skinner's positive sanctions). The second way is to incorporate the non-normal or non-predictable into the communications web so that it becomes assimilated to the normal or predictable. (The process is a more subtle modulation of the traditional English practice of co-opting rebels into the Establishment by elevating them to the peerage or by using similar seduction devices.)

Five years ago, Allen Ginsberg was an interesting individual. Today, as part of the communications and entertainment network, he has been assigned and has accepted a harmless role – that of professional eccentric, something like the shabbas goy in Orthodox Jewish households. Now, Ginsberg can affect the audience only as an actor does – that is, not as himself. Instead of believing in what he says we accept him for what he seems to be.

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The absorption of the originally salient individual into the electronic and publicity Establishment, together with the general personality-nullifying power of all technology, makes for the weakening and eventual disappearance of that traditional humor based on the identification and enjoyment of unusual or eccentric persons or fictional characters.

Humor is often thought to arise from the consciousness of a certain discord, from the perception of the discrepancy between man's vision of himself and what the world permits him to be: Don Quixote.

Now it is reasonably clear that, assuming its survival, the human race is gradually being herded into a single Skinner world-box, its behavior to be controlled by positive and negative sanctions.

The prime characteristic of the Skinner world-box is order achieved through predictability. In such a world-box the discrepancy between what he is and what he would like to be is no longer perceivable by the human rat inhabiting the box. As this perception is one of humor's mainsprings, we may expect humor to die out in proportion to the tempo of the manufacture of the box. Total efficiency and the humorous consciousness of disorder seem to be antithetical. Pioneering partial Skinner boxes, such as China and the Soviet Union, seem able to dispense with humorists.

A Lopsided Poet

While humor can inhere in jokes, good humorists are not essentially joke-makers. A good humorist is a kind of visionary, like a good poet. His way of looking at the world is total, or near-total, tending to exclude other ways. A Thurber or a Perelman or a Benchley sees everything from his own angle of vision, slightly askew. This skewed world is his natural habitat. But the Skinner world-box cannot accommodate this special vision of the humorist, who requires an environment in which there is much flexibility.

Neither the Skinnerian nor the anti-Skinnerian has much use for humor. The Skinnerian, aiming at adjustment, will naturally reject the creative maladjustment which the humorist's skewed vision treasures. The anti-Skinnerian cannot afford to blunt, by humor, the vigor and ferocity of his attempt to escape or destroy the world-box. The consequence is a gradual diminution of the audience for humor. The New Yorker was once the best humorous magazine in the world. It is now becoming an excellent organ of social indignation.

The exercise of wit, the playful, non-purposive kind of humor, has departed from us and will probably be absent for the next few hundred years. What we have instead is a lush growth of highly purposive humor; we have humor as a weapon.

The communists used to say that everything must be used as a weapon. For them, all forms of cultural exercises were weapons. That is the way we tend to use humor today. We use it as a weapon to beat someone over the head, or to defend our point of view, or to produce an effect in an audience that will lead to some kind of action or arouse an emotion.

The greatest humor – that of men like Dickens and Cervantes – does not do that. The greatest humor radiates you, makes you feel happy, gives you a joyful illumination, an insight into the absurdity or the interesting disharmony of all human life. When you are reading "Pickwick Papers" you are not moved to do a thing except read the next page.

It is a mistake to assume that all humor is at the expense of someone else. The greatest humor reconciles us to the human race rather than alienating us from it. It does not point out the enemy; it points out how funny our friends are. It proceeds out of a kind of wistful affection for the human race, an affection that wishes the race were better than it is. Such humor measures the distance between what we are and what we would be.

Humor – once associated with benevolence, sympathy, tolerance (reflect on the phrase "good humor") – is taking on the special form of gallows jokes. Black humor does not aim to amuse, to evoke laughter or smiles. It aims to evoke the sensation of the grotesque (humor in its pathological form) by elevating to a plane of exaggeration our contemporary sensations of disgust, frustration, and self-hatred. It bears somewhat the relation to traditional humor that necrophilia bears to standard secual intercourse. It is the "diversion" of an intellectual community, which, having lost its nourishing roots, must feed on its own flesh. In this sense Samuel Beckett is the representative humorist of our age.

Violence as Comedy

We are also seeing today, especially in the movies, violence offered as humorous fare, and we find that audiences are laughing at the spectacle of people being killed or wounded or gravely endangered. The laughter is not belly laughter. It is rather a kind of nervous reflex, but it is laughter.

The reason for this lies, I think, in the history of the last 30 or 40 years. We have learned to accept the idea of mass death and mass violence as normal rather than

abnormal. The importance of the mass murder by the Germans of Jews, Poles, Gypsies, and others, in the 1930s and 1940s, lay not so much in the fact that human beings suffered but that the rest of the world knew about it, tolerated it, and passed it by.

In that sense, the Germans won the war. They convinced the rest of the world that mass murder, if performed with technological slickness and efficiency, would pass; it would be tolerated; it would be excused; and, indeed, it would furnish the model for later mass murders. Nothing is going to happen because of the Mylai massacre in Vietnam. Nothing happened about Dresden, or about Hiroshima, or about Nagasaki.

Violent death has become absorbed into the consciousness of the human race as a normal phenomenon, and so we can laugh today when violence is represented with a comic aspect, whereas 20 or 30 years ago that would have been impossible.

Another non-traditional form that humor will naturally assume in a technological age is the humor associated with objects rather than persons. The technological society, to achieve null-friction, must encourage human beings to center their affective life in objects, which are more subject to control, rather than in other human beings.

This affects humor as well as all other cultural phenomena. We can see it at work already in television: the most amusing part of television is not its comics but its commercials. It is on the often delightful commercial playlets and blackouts that the greatest ingenuity, warm-heartedness, and humorous playfulness are expended. Commercials, of course, are about things, or about people thought of as things – consumer machines.

The great social use of humor has always been therapeutic. By exposing the comic-pathetic quality of the human condition, it temporarily reconciles us to that condition without creating in us complacence, lethargy, or any other negative emotion. A good laugh, as we say, makes us feel better.

As long as the human condition remains recognizably human, humor – though transient in appeal and varient in form – will continue to exist. All indications, however, now suggest that the human condition is becoming the mechanical condition. Whether a humanoid humor is possible is open to question. So far the computer has not learned to smile.

Environment: A Challenge For Modern Society

By Lynton Keith Caldwell
(A Selected Chapter)

Environmental Management as an Ethical System

The management of man's relationships with his environment is a practical expression of a system of ethics; it is an application of values, beliefs, and moralities to relationships not only between man and nature, but between man and man. Yet nowhere in human experience do ethical concepts appear to be more confused nor moral issues more often evaded by misconstruction. A new statement of ethics is needed to guide man's conduct in a world in which the conditions of a spaceship prevail. It will not be sufficient to rely solely upon internalized patterns of behavior for assuring ecological good conduct among the transient passengers of Spaceship Earth. Ecologically valid ethics must also be institutionalized in law and in administration, and made operational in relations among men and between man and the rest of the natural world. The ultimate outcome of the changes that are required can be hardly less than a new phase in the development of human society.

Twentieth-century man has been working his way into an environmental predicament with which he is emotionally and philosophically unprepared to cope. Should current dominant trends and attitudes continue, the future can, at best, hold little promise for the quality of life that the more fortunate of civilized men have generally found attractive. For the less fortunate, the near future may be somewhat more attractive, offering hope for more food, clothing, shelter, medical care, and education. Technology can provide greater material abundance at less labor than has ever before been possible. But whatever satisfaction is obtained from these improvements may be of short duration. Technology cannot guarantee its own wise use; it cannot insure that man will in fact be happier, healthier, and safer in the future than in the past. Unless man can relate to his environment with greater foresight than he has shown, the material benefits and securities of the future may resemble those of the hospital ward or the military post. The psychological deprivations threatening the future could prove more difficult to bear than the material hardships to which men have been inured during centuries past.

Failure to develop a workable environmental ethic adds to the probability of a future in which mass frustration becomes the dominant social problem. We can, for example, create a world in which food, housing, and other necessities are available to all – in which the allotment permitted to each individual is socially determined and in which no one, regardless of personal preference, may obtain more, or less, than his "fair" share. In the world that technology can build, the good things in life may well be free – to each in his turn – and in an amount consistent with other people's freedom to enjoy them. It may even be possible to spare some "useless" area of the Earth for solitude, but bureaucratic procedures would doubtless be necessary to prevent its being overrun by refugees from a wantless society.

This impending "rationalized" environment will follow, if it does, in part from a failure of foresight – which would also be a failure of imagination. Modern man has seldom sensed the danger of a partial perception of the consequences of his action. Faith in the infinite beneficence of technology and the almost infinite adaptability of human beings has led men into acts of difficult, expensive, and socially unrewarding foolishness. Technological extravagances such as supersonic transport, a tunnel under the English Channel, and a second Central American isthmian canal are foolish not because they are logically absurd, but because they are undertaken in preference to less-glamorous tasks that are feasible and are essential to human welfare. The costs of misapplied technology in

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foreclosed future opportunities can be very high when the ecological basis of life itself is imperiled.

The ethics of man's environmental relationships travel from the philosophically profound to the childishly absurd. Our ecological crisis no doubt has deep historical and religious roots. It may also result from human vanity, slovenliness, and an urge for excitement. The tasks of ecological protection and maintenance are essentially "housekeeping chores." They are not "fun," and they confer little prestige. Whatever reputation Hercules won by cleansing the Augean stables was due to the enormity of the task rather than to its heroic character. In short, man's traditional sense of values does not help him greatly in maintaining ecologically valid priorities in relation to his environment. At least in the Western world, he has relied for guidance or justification upon an ethic that commands him to subdue "nature" – but does not tell him how or to what end this effort should be directed. The conventional attitudes of modern industrialized man toward his environment have been shaped by circumstances largely irrelevant to his present condition. Having radically altered his situation in relation to his environment, he has not yet reinterpreted the ancient goals and values to fit the new condition.

One consequence of man's failure to develop a generally acceptable and beneficial environmental ethic has been conflict. Competition among men in subduing the Earth and in exercising dominion over it has been one of the grand themes of human history. In this struggle, the Earth, as well as man, has often been the loser – as when irreplaceable natural resources are destroyed through human blindness. And when the Earth loses, so also does man – since from its soil, water, atmosphere, and living creatures, and above all, from their integration into environments the total man is sustained.

Relating Man to Nature

Understanding of man's environmental behavior would doubtless be strengthened by more adequate knowledge of his actual perceptions of the natural world, and his concepts of his relation to it. Information on environmental perception has been rapidly growing, but we are still largely dependent upon conjecture and deduction in discerning how men really understand their environmental condition. This knowledge is important to the process of environmental management chiefly as "feedback." Environmental administration is largely the management of men in relation to their environments, and therefore the behavioral tendencies of men and the beliefs that motivate them are of practical relevance to the administrative process. If men are to relate wisely to their environments, it is necessary that they perceive their environments accurately and realistically. In order to guide men's actions in relation to the environment, it would obviously help the administrator to understand the prevailing perceptions of environmental relationships.

An important function of administration in any context is to promote the internalizing of individual patterns of behavior that facilitate goal attainment. For many environmental objectives, the most efficient and effective avenue is through internalized individual behavior. For example, prevention of highway litter or of man-made forest fires is possible only to the extent that voluntary individual behavior corresponds to official public policy. Men are too numerous and relate in too many ways to the environment to make "policing" alone a feasible method of environmental protection. Environmental administration must therefore be concerned with the beliefs and behaviors of people in relation to the environment and, to whatever extent necessary, must encourage and assist the development of realistic and ecologically responsible attitudes.

Proximity to nature does not in itself cause men to understand or to respect the natural environment. Love of nature is seldom strong among those who wring from it a precarious livelihood, or who suffer the miseries of drought, flood, cold, earthquake, or famine. At a time when man lacked the technology to "control" nature, he attempted to placate and persuade its capricious divinities through ritual and sacrifice. But with the advent of science, the illusion of control through religion was replaced by the concept of control through technology. And through scientific technology, man did indeed obtain a far greater measure of control. But in this very success lay the illusion of ultimate and complete control – an assumption unjustified by our knowledge of the natural world, or of the limitations of human capability.

The limited ethic of the Book of Genesis is an understandable consequence of man's uppermost necessity – to survive amidst an implacable natural environment. For centuries, man's attitude toward his environment has been influenced by his need to free himself from what has seemed to him to be its harsh and often unpredictable behavior. Primitive man, in order to become modern man, had in some measure to "subdue" nature. More accurately stated, man has sought to turn

nature to his advantage. To do this, two requirements have been imposed upon him by the circumstances of existence. First, he has had to learn from nature in order to gain whatever measure of freedom he has obtained from it or over it. Second, he has had to master himself to the extent necessary to attain the degree of mastery over nature toward which he aspired, and there appears to be a direct correlation between the degree of purposeful mastery attempted and the self-control required.

The historic search for means to secure the basic necessities of life has inevitably shaped the attitudes of men. From each environment, man has sought those things that would serve his felt needs. Thus he has seen in the environment the things he sought – the natural resources for food, clothing, and shelter. But he has been slow to perceive the environment in its entirety as a resource, for he has seldom recognized in the total environment an answer to any specific need. Prior to the technoscientific age, human concern for the total environment was less pertinent to human welfare, for there was little that man could do to readily or irreversibly affect it. Beyond this, the identification of less-obvious but not-less-real psychological necessities has had to await the advent of modern behavioral science – albeit it was long ago said that man does not live by bread alone.

As noted earlier in this volume, two major ways of looking at the world have characterized man's attitude toward his physical environment; the first may be termed *economic,* the second *ecological.* Each outlook has its distinctive ethic; each has deep roots in different aspects of history; each in its own way has been influenced by the growth of science. The economic viewpoint has been dominant and traditional: the food-clothing-shelter view of life. The ecological, while also rooted in the past, is only now beginning to challenge the dominant concept.

The *economic* viewpoint is simple, direct, and obvious. It speaks to man's unavoidable personal needs; it requires no philosophic subtlety or scientific experiment to demonstrate its validity. It has often been associated with the "market" orientation described in Chapter I, but the two outlooks are in no sense identical. In a world where man's struggle for survival began with the external forces of nature, the economic attitude has served him well. From it has come a guiding element in the ethics of peasant, pioneer, engineer, and industrialist: to make nature serve man's material needs. Under various interpretations, this ethic implies a world created for man to exploit. Material wealth is seen as the natural and proper goal of man's efforts; to this end, mastery over nature becomes a fulfillment of human destiny.

The ecological viewpoint is difficult to describe, because it tends toward greater complixity and because its elements and their origins are diverse. The essential elements may be summarized as ethical, aesthetic, hygienic, and scientific. The combination may appear strange, and the relative importance of the elements in the attitude of any individual may vary greatly. But some combination of these ingredients may be found in most ecological attitudes. States as a simplified abstraction, the ecological viewpoint might be described in these terms: Man is a part of his own environment and is in continuous interaction with it; this total environment exists in dynamic equilibrium governed by natural "laws," which cannot be disregarded with impunity and which exemplify the order and reliability of the universe. In this picture, the poet and the mathematician alike may find beauty, and the moralist and the scientist may find reasons for living in accordance with natural "laws." The ethical and aesthetic elements of this viewpoint are as old as the civilizations of India, Greece, and China. The hygienic and scientific aspects are also of ancient origin, but demonstrable knowledge concerning relations between man and nature is largely a product of modern times.

As argued elsewhere in this volume, the economic and ecological approaches toward man/environment relationships are not necessarily antithetical. There are many occasions when, if all relevant factors were considered, each approach might lead toward very similar or compatible outcomes on environmental-policy issues. The absence of this convergence appears to be largely a consequence of the way in which holders of the respective viewpoints choose to interpret man's relations with his environment. Too often, the perspective is arbitrarily partial – the economist omitting from his purview the ecological consequences of human action, and the ecologist ignoring the structure of economic values. There are, in fact, large areas of overlap. It is in these areas that much of the need and substance of an ethics of environmental relationships is to be found.

Too little is presently known regarding the interaction of cultural and psychobiological factors to permit more than conjecture regarding relationships between human personality and attitudes toward the environment. Yet it would be useful to know whether the personality traits summarized in the term "masculinity" represent an inherent disposition toward aggression, domination, and control. And are there ordering and conserving tendencies in femininity that tend to inhibit

unnecessary interference with the natural systems of the Earth? It is conceivable, although undemonstrated, that the care and custody of the Earth would fare better to the extent that woman – the natural embodiment of femininity – played an active and direct role in public policy making and administration. With some significant exceptions – such as life on shipboard – good housekeeping has not been viewed as a task appropriate to men. The tasks of environmental conservation and control may be described functionally as ecological housekeeping. The economics of ecological housekeeping could differ significantly from an economics of exploring, building, and trading, and it may be that the substance and emphasis of economic thought in modern industrial society are to be explained more as a consequence of masculine dominance over social values and institutions than by anything allegedly inherent in economic "laws."

If basic personality dispositions are significant factors in environmental attitudes, it is conceivable that the growing "liberation" of women from the tasks of domestic servitude and childbearing may result in profound social consequences. History and traditional humor may prove to be unreliable indicators of the respective influence of the sexes on societies in the future. Feminine influence in a society in which equality of the sexes exists *in fact*, might assume forms and pursue goals quite different from those observed in male-dominated societies. The influence of women in public health, social welfare, and conservation has already been notable, and it would seem highly probable that it will be a greater factor in the spaceship economy of the future.

Meanwhile, social action occurs within a matrix of assumptions and institutions in which the influence of the past is strongly evident. The values and beliefs that have served human needs for millenniums are still pervasive, even though the radical changes in man's relationship to the world of science and technology have made many traditional patterns of thought and behavior useless and even dangerous in today's world. These precepts and concepts exist in the substrata of the mind; they underlie and condition social attitudes. But they are seldom consciously articulated. Intellectually, the secularized and sophisticated modern man accepts the reasoning of the **Origin of Species**, but he often behaves as if he assumed the creation as described in Genesis:

> Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion. . .

Thus, an ethic common to three world religions justifies the subjugation of nature: man is prior to nature and, like God, is, at least in concept, outside of nature. The ecological viewpoint finds little overt support in Genesis; the economic view seems almost implicit. We cannot be sure of the extent to which Judaic ethics have influenced environmental attitudes in the Islamic and, more importantly, in the Christian worlds. But the felling of druidic oaks by Christian zealots is symbolic of the antipathy of a Christian attitude toward pantheistic nature worship, and of indifference to the natural world. Subjugation of the world to man's dominion was ordained by the God of Genesis. As to the fate of the world – it mattered little. Man's temporal travail on Earth was but preparation for the eternity to come. Nevertheless, the evolution of Christian thought has been advanced by St. Francis, and more lately by Albert Schweitzer, toward a religious ethic consistent with the ecological attitude.

Karl Marx, on the other hand, rejected the religious basis of ethics in what Arnold Toynbee has nevertheless suggested is a form of Judaeo-Christian heresy. Marxism, committed to economic determinism as an explanation of human behavior, has tended to be inhospitable to ecological thinking in relation to natural resources or the human environment. But Marsixm, like Christianity, is susceptible of varied interpretations and of accommodation over time to the growth of scientific knowledge.

Growth of religious concern for man's behavior in relation to his environment is becoming evident in overt action. For example, among religious leaders, Dr. Truman B. Douglass, of the United Church of Christ, expressed what appears to be a growing attitude that the desecration of nature is an immoral act, an offense inconsistent with the concept of God as Creator. In a message to the United Church Board of Home Ministries, on October 27, 1965, which was reported by United Press International, he declared that although the Bible teaches that man was appointed to exercise "dominion" over the Earth, this does not mean that he is free to exploit nature ruthlessly for his own immediate desires: "We are to be responsible custodians and stewards of the precious and irreplaceable gifts of the natural order, which are to be used for the good of the whole." "Do we have a right," he asked, "to hand on to our successors a riddled, raped and ravaged planet?" And the more sensitive issue of population policy has been linked (as it should be) to environmental quality in The First National Congress on Optimum Population and Environment, scheduled for June 7-11, 1970, and of which

the Episcopal Diocese of Chicago has been a principal sponsor. Thus, if the Judaeo-Christian ethic could once have been read as indifferent to man's misuse of the Earth, it can no longer be maintained that this interpretation is universally accepted by religious leadership. There is a great need and opportunity for religious thought, freed from fetters of dogma, to assume a role of leadership in extending and refining human ethics to meet the ominous challenges of the coming era of Spaceship Earth.

Not Prudence But Necessity

Even our underdeveloped understanding of man in relation to his environment reveals the most fundamental and elementary fact about the significance of the relationship: regardless of how man perceives his environment, he cannot escape interaction with its complex totality. If man is to relate himself to his environment with wisdom and foresight, he must understand it as it is – something more than the sum total of its parts, more than an aggregation of natural resources; itself a resource – the basic resource of life and all man's hopes.

Who would judge it prudent for an astronaut to manipulate the controls in his spacecraft without knowledge of the total system or contrived environment of which they are an integral part? And yet humanity, often in ignorance or optimistic disregard of its mechanisms, presumes to manipulate the environmental controls of Spaceship Earth with impunity. If the astronaut is only moderately imprudent, he may possibly save himself by return to the mother spaceship, Earth. But if humanity should render its earthly environment inhospitable, where then?

To exist in outer space, man has had to examine the conditions governing his existence on Earth. In contriving an artificial environment upon which his life depends, he dare not take any part of his environment for granted, nor can he safely overlook the interrelating of the parts and their synchronization in relation to the whole. This whole environment is not merely biophysical in the narrow sense, but must include, as we have noted, behavioral factors – the social, psychological, and undefined spiritual factors that elude measurement but may nonetheless motivate achievement and surmount adversity. The spaceship – microcosmic man-made planet – may therefore serve as model and symbol of man's cosmic predicament and may afford guidance toward a reformulation of prudent and ethical conduct.

To see environment as a resource to be understood, conserved, and utilized with regard to the total needs of the total man has become an ethical necessity. This comprehension was not a necessity as long as human numbers were few and technology simple. Primitive man in isolated cases may have destroyed himself through destroying his sustaining environment. But the world was relatively big and empty. There was room for error – even vast and catastrophic error. The human race moved on and found new lands in which to flourish.

Circumstances are now different. Talk of the necessity of interplanetary migration – even in fancy – tips our hand, revealing that we hold a limited number of ecological cards. The environmental resources of the Earth are no longer in any sense boundless. Nor, except in the occasional poetic flights of astronomical fancy, are the endless reaches of the universe open to direct exploration by living man. He is rigorously limited in time and in space. Eternally and absolutely limited by the environment necessary to sustain his life, man's highly touted mastery of nature is a self-deluding myth; not a myth that is really believed – not even a new one. King Canute of Denmark and England is alleged to have staged a notable demonstration of its falsity centuries ago. But it has persisted and has grown with science and technology as a vague, unexamined assumption underlying all too much of our present-day behavior.

Man remains – as ever – at the sufferance of the cosmic order. But today, in a sense more complex and more difficult to comprehend than in the simpler past, man's survival depends upon his ability to safeguard his environment through control of himself. For, through his own effort and ingenuity, he has become the greatest threat to its stability, and thus, indirectly, he threatens his own future.

Arthur C. Clarke, philosopher of the future and writer of prophetic science fiction, has suggested two common-sense rules of ethical relevance for safeguarding the future:

1. Do not attempt the unforeseeable.
2. Do not commit the irrevocable.

He explains that "though these rules have often been broken, in the past it seldom mattered; for the damage was confined to the meddler and his immediate vicinity. This is no longer the case; the consequences of meddling are now global and will soon be astronomical." This counsel is essentially that of prudence, and it corresponds to that contained in the 1965 report of the Committee on Science in the Promotion of Human Welfare of the American Association for the Advance-

ment of Science, and the valuable little book *Science and Survival* written by the Chairman of the Committee, Barry Commoner.

Observing that "the entire planet can now serve as a scientific laboratory," the report recounted a series of cases in which the new large-scale experiments and technological developments of modern science led to unanticipated and unwanted effects. These unhappy outcomes were chiefly the results of ". . . technological application before the related basic scientific knowledge was sufficiently developed to provide an adequate understanding of the effects of the new technology on nature." The system of scientific inquiry and discourse, which might have avoided these failures, was in no case fully used. The remedy, in the judgment of the committee, was not primarily to promulgate a suitable code of ethics for scientists. Although recognizing the importance of the scientists' personal outlook, the committee concluded, ". . . this viewpoint is largely a reflection of the system of discourse in which the scientist must operate. We believe, therefore," it declared, "that steps to strengthen the integrity of science should be centered, to begin with, on the *system* rather than on its participants."

This reasoning applies with equal force to the management of the environment, which is now massively affected by and through the applications of science-based technology. The integrity of society itself is at stake, and it depends upon more than the integrity of science. But the corruption or misuse of science can destroy not only the integrity of society, but society itself. An ethic powerful enough to control the use of science can be hardly less than an ethical system sufficiently strong and comprehensive to shape the goals and procedures of society.

From the outset of this volume, it has been argued that man's behavior in relation to his environment is integral to his total culture. One cannot have a special ethic for conservation and the environment, and another ethic for the rest of life, within a coherent society. It is not necessary that society be coherent or that its tendencies favor moral or intellectual integrity. Nor is it necessary that any society or species survive. The argument for a system of ethics that includes an ethic of environmental management is that such congruence is very probably necessary to the survival of civilized man. One who is indifferent to human survival can afford to be indifferent to human ethics and to the environment; others cannot.

Prudence is a necessary but not sufficient basis for an ethic of man/environment relationships. The ethics and politics of prudence have been criticized as unworthy of noble ends or moral purpose, but in the protective management of the environment, prudence is merely a means. It is neither an end nor an issue. If the survival of civilized man is the objective, then an ethic of conservation and protection is not a matter of mere prudence but of necessity.

There is a strong current of informed opinion in contemporary society that foresees major ecological disaster for the human species before the twentieth century has run its course. For example, anthropologists Irven DeVore and Richard B. Lee believe "It is still an open question whether man will be able to survive the exceedingly complex and unstable ecological conditions he has created for himself." David Lyle suggests, "The human race has, maybe, thirty-five years left." And ecologist C. S. Holling conjectures a half-life for modern man of perhaps ten years. These misgivings are not widely shared, or at least publicly admitted, among the leaders in government, industry, or technology. There is a pervasive belief in modern society that technoscience will find a way out of impending difficulties. The uncertainties of the dynamic, technoscientific world make any prediction hazardous. The projection of present ecological trends would indicate inevitable disaster, but no one can be sure that these trends will persist, or that their effect may not be altered by new and unforeseen developments. The basis of policy for the future cannot therefore be solely statistical, and it cannot safely be guided merely by doubt or faith regarding man's ability to manage his technoscientific culture. Knowledge of what is in fact happening is an essential concomitant to an operational ethic.

Beyond man's elementary needs, his goals rest upon ethical assumptions – upon what he believes to be "good" and "bad" in life. But it has long been observed that what an individual may perceive as good for *him* may in no sense be good for society. In addition, there are several tests for the truth of goodness. When science is invoked to fulfill human purposes, it is not enough that a thing appear subjectively to be good; its goodness must also be measured by the tests of scientific truth. A valid ethic of man/environment relationships cannot therefore be left solely to individual conscience or to collective opinion. And if one were to name the single greatest cause of the ecological crisis of modern society, it would surely be this: that man has thus far failed to unite science and ethics in a manner adequate to guide, restrain, and control individual and collective behavior in relation to the real world. He has been relying upon the

inadequately developed ethical systems of traditional society to guide him in a world transformed by the process of science and technology.

Traditional interpretations of ethics have been failing modern man – and the failure is all too visible in decline of religion, decay of morality, and disrespect for public law. It is not that the age-lone ethical experience of man has become invalid; it is that inadequate interpretation and development of these ethics in a changed world has made them appear irrelevant. Rearticulation of ethical systems is perhaps the greatest and most difficult price that modern societies must pay for the opportunity to use scientific knowledge without enormous hazard. No modern society has thus far paid this price, and it is doubtful that unless all do, any can. No nation can itself save the world from ecological disaster, and in a world divided by predatory political ideologies, unilateral efforts toward ecological sanity involve international risks that national governments cannot lightly incur.

Since the advent of the conservation movement, and in other contexts before that, efforts have been made to internalize a "conservation ethic" in individuals. Whatever success these efforts have had has been far less than that needed to arrest the trend toward ecological disaster. The internalizing of new rules of conduct is essential to the effectiveness of ethics in society, but it cannot be obtained solely through efforts focused upon the values and behavior of individuals. The social context of behavior must also be considered. Ecologically valid ethics cannot be effective until they are internalized in individuals and externalized in social institutions. Only through a system of mutual reinforcement can the individual and collective aspects of ecological morality become a decisive force in modern society.

Efforts toward both objectives are being made, but it is doubtful that the magnitude is anywhere proportionate to the need. Time is running out for modern man to bring his ethics into line with his technoscientific capacilities. This task is not only one of upgrading morality; it is also one of re-establishing contact with reality. Contemporary man appears to have become intoxicated by the sudden efflorescence of his technology and to have convinced himself of his competence and infinite adaptability. In reckless pursuit of technological innovation and economic "development," a large part of modern society has lost touch with a large part of reality. The measure of this disorientation is a measure of social sanity or insanity. A society equipped with unprecedented technoscientific power, and that is even partially insane, is a dangerous society.

If this gloomy assessment of man's present predicament is valid, the question of remedy becomes paramount. It is not necessary to debate the related question of determinism versus freedom of choice in the shaping of man's future. Because the question cannot be resolved, it is rational to proceed on the hypothesis that human destiny may to some extent be planned and directed by human choice. This possibility is widely accepted and is indeed a basic assumption of the modern attitude. The question of remedy for present ethical inadequacy is a question of how and where an adequate operational system of ethics can arise. Many elements of such a system have already been developed through the efforts of conservationists and socially sensitive scientists. Some evidence of a new ethical orientation is appearing in proposals for changes in law and administration, and the growing concern in religion has already been noted. It seems possible that a new, pervasive, and dominant ethic might emerge that would radically alter man's behavior in relation to his environment, although it may require a catastrophe of global proportions to catalyze the latent elements of a new philosophy into a coherent and generally accepted public doctrine.

The Ethics of Respect

The epitome of modern man is the American. Historical circumstances have combined to make America the scene of some of the sharpest contrasts in environmental attitudes and some of the bitterest conflicts over environmental values. Paradoxically, it may be that, in America, where nature has perhaps been most ruthlessly exploited and where an environmental ethic has perhaps been least comprehensible to the mass of the people, a concept of the environment might now develop that will unite scientific fact, social outlook, and ethical value. In exploring the basis of an environmental ethic, the American may therefore be taken as representative of modern industrialized man everywhere; his successes and his failures in the management of his environment stand out more sharply than those of other peoples.

The basic element of a system of ethics appropriate to a space age does not differ from that which has always been fundamental to wise relationships between man and nature. Only it is now more urgent. This element is respect for the creative forces that have made the world, the universe, and man. This respect should

grow rather than diminish with the advance of knowledge. Neither the idolatry of the nature mystic nor the arrogance of the technocrat is an appropriate response to the reality that man increasingly discovers. Modern man can no more explain the presence of the world and himself in it than could his ancestors at the beginning of historic time. From his limited human perspective, he views the world most wisely and most accurately when he views it with an attitude of wonder. The man to whom the world is truly wondrous is not likely to launch himself blindly toward unforeseeable outcomes, nor willingly to invite irrevocable or irreversible effects.

The ethical challenge implicit in respect for creation in the coming era of Spaceship Earth has been stated with simple precision by Norman Cousins: "The real meaning of the human expedition to the moon, if it is read correctly, is that the conditions required to sustain human life are so rare in the universe as to constitute the greatest achievement of creation. Yet the prime beneficiaries of this bounty are now engaged in converting their habitat into a wasteland not less uncongenial to life than the surface of the moon. The biggest challenge of all, therefore, is to prove that intelligent life can exist on earth."

It was perhaps the most characteristically American of philosophers, Ralph Waldo Emerson, who saw that the ultimate aim of all science was to find a true theory of nature, which must also be a theory of creation. But Emerson understood that an infinitude of nature lay beyond the present reach of science and the human intellect. The world in its most common aspects should not therefore be treated as if it were vulgar. There is a continuum of reality, extending from the most mundane things to the mystery of creation, that man perhaps may never be able to understand. The child and the scientist are thus in one sense equal before this ultimate mystery. "Nature," wrote Emerson, "never became a toy to the wise spirit. The flowers, the animals, the mountains, reflected the wisdom of his best hour, as much as they had delighted the simplicity of his childhood."

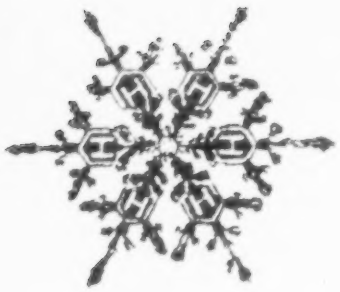
An ethic adequate to man's responsibility for his environment need not inculcate reverence for creation, but, at peril of disaster, it must be based upon profound and genuine respect. If there is a moral for man in relation to the environment, it is to resist temptation to treat the familiar with contempt on the assumption that it is nothing more than what one sees. The mundane is no less wonderful because it is accessible to man's comprehension and manipulation. And if there is a second moral for man in relation to his environment, it is that science should never be joined to arrogance. In a world in which the child, the scientist, and primitive man are in equal ignorance of the ultimate cause and meaning of creation, there is still a place for the human sense of wonder. The heavens are no less wonderful because through science some small part of their mystery has become known to man. The essence of an adequate ethic for man's environmental relationships must surely include a sense of wonder and respect for the familiar.

"If the stars should appear one night in a thousand years, how would men believe and adore; and preserve for many generations the remembrance of the city of God which had been shown!"

PERSPECTIVE

"Human history more and more becomes a race between education and catastrophe"

H. G. Wells



The Easy Chair

Survival U is alive and burgeoning in Green Bay, Wisconsin

John Fischer

If a 1965 GRADUATE were to return today to Harvard – or Berkeley or Kent State – he would have no trouble in recognizing the old place. In spite of the years of protest, demonstrations, riot, and arson, he would find that most of the old courses still are being taught in the same old way, by the same professors, and often from the same lecture notes. So, too, at nearly all of the long-established universities. Close scrutiny might reveal a few changes around the edges: students added to some committees (but not those dealing with faculty hiring and salaries), ROTC courses abolished, government research curtailed, black studies added, and probably a new president. But underneath the cosmetics, the bone structure of the university, the traditional departments, remain much as they were fifty years ago; and the basic decisions still are being made, as always, by the senior faculty.

Ten years from now, in the universities the stiuation is likely to remain much the same. For they are like the Galapagos tortoises: slow-moving, shell-encrusted survivors from an earlier epoch, whose evolutionary adaptations can be measured only on a geological time scale. The more I see of American academic life – and I have been seeing a good bit during the past decade – the more sympathy I feel for the frustrations and impatience of the undergraduates. Though I feel no sympathy at all for their occasional outbursts of violence which are as futile as kicking a Galapagos tortoise: they may break a toe, but they don't change the nature of the beast.

Consequently, I have become convinced that any early and significant reform of American higher education can be hoped for, not in the established universities, but only in the new ones that are being started here and there throughout the country. In July 1969, I reported here on the innovations which are being attempted at the new campus of the University of California at Santa Cruz – an institution founded on a fresh, though by no means revolutionary, concept of education. Then in September 1969, I suggested in this column a more radical departure: a Survival U, where all work would be focused on a single unifying idea, the study of human ecology and the building of an environment in which our species might be able to survive.

At the time, I supposed such an institution was wholly imaginary, if not utopian. So, apparently, did most of my readers. That column resulted in more correspondence than anything I have written, and was more widely reprinted; it was included, for example, in *The Environmental Handbook,* a paperback distributed in hundreds of thousands of copies for the nationwide Earth Day teach-ins of April 22, 1970, and individual reprints are still being used in scores of classrooms and conservation groups.

To my embarrassment, I discovered a little later that a real Survival U had opened its doors in 1969, after three years of intensive planning. I had never heard of it, and even now it seems to be almost unknown throughout the rest of the academic world. Recently I spent several days there, talking with its students, faculty, and administrators – and I came away persuaded that it is the most exciting and promising educational experiment that I have found anywhere. If I were about to start to college, it would be my first choice – ahead of anything in the Ivy League or even Santa Cruz, which in comparison seems like a rather self-indulgent ivory tower in the redwoods.

It is a new campus – or rather a cluster of four campuses – located in and around Green Bay. Officially it is part of the much-troubled University of Wisconsin system; but in almost every aspect it is light-years away from anything ever tried before, in Wisconsin or anywhere else. It is a truly radical innovation, not only in purpose but in its internal structure and methods of teaching. Among other things, it is trying to break down

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the hegemongy of the traditional disciplines – economics, political science, English literature, chemistry, socialogy, and all the rest – which have imposed such a rigid pattern of departmental organization on the conventional universities. If Green Bay succeeds (an open question, since it is still in a precarious formative stage), it just might show the way for higher education to bust out of its Galapagian shell and sprout wings.

Like the imaginary Survival U, Green Bay is trying to focus all of its studies on a single overriding subject: ecology – that is, the environment we live in, both physical and social. Only recently, and perhaps too late, many of us have begun to realize that this is *the* cardinal subject. For unless we learn, pretty fast, to live on the earth's thin crust without destroying it, all the other subjects – from philosophy to twelve-tone music – will not only be irrelevant, they will simply disappear, along with *homo nonsapiens.* (If anyone is still skeptical about this dire fact, he would do well to look at the recent writings of Paul Ehrlich or Rene Dubos or the latest book from America's only scientist-poet, *The Invisible Pyramid* by Loren Eiseley.)

Moreover, in its broad sense ecology embraces all other subjects. The places where a man works and sleeps are part of his environment, just as the air he breathes and the sounds he hears, including both motors and Mozart. Whether this environment is good or bad depends on many things – economics, engineering, government, and geography, to begin with. Even international relations, since war could be the ultimate destroyer of the environment. Understood in this way, as it is at Green Bay, ecology is not simply one academic subject among others. It becomes an approach to all learning, a framework for organizing every field of study.

Until my recent visit, I knew nothing about the city of Green Bay except that it had produced the late Vince Lombardi and his legendary Packers. I found it to be a typical Middle America community of about 100,000 people, located on an arm of Lake Michigan with a hinterland of rich dairy country. Its people are mostly lower-middle-class, of Northern European stock, who work in the local paper mills, packing plants, cheese factories, and metal-working shops. Because they place a high value on education, they had built some years ago a two-year community college, financed out of local taxes. Three smaller towns, within a radius of sixty miles, had similar colleges. They and the other communities of northeastern Wisconsin had long been campaigning for a fullfledged university in their part of the state; and, in 1965, the legislature authorized such an institution with a special mandate: to serve the "needs and potentialities" of that area, and of the whole Northern Great Lakes region. As a starter, the new university took over the four community colleges, and a new campus to serve as a center is being built on the bay shore on the northeast edge of Green Bay.

To head the new institution, the state chose Edward W. Weidner, a man with a rare combination of talents. He is an academic administrator with imagination, the courage to strike out in new direction, organizing ability, and a knack for persuading others to go along with his ideas. A political scientist trained at the University of Minnesota, he had taught at four big state universities, run the Center for Developmental Change at the University of Kentucky, and worked on a number of government and foundation aid projects in Asia. What he saw there, and in the Tennessee Valley, led to his deep concern with problems of human environment. More than any other single person, he is responsible for the innovations at Green Bay.

Next to the emphasis on ecology, his most daring innovation is his break away from the sacrosanct departmental structure. At conventional universities this structure, along with the tenure system, is the flintiest obstacle to change.

Usually each department – Romance Languages, say, or History, or Architecture – has a customary number of job slots, most of them filled with tenured faculty members who cannot be fired. Since they choose the new men entering the department and decide who shall get tenure and when, old ideas tend to be perpetuated from generation to generation. Even the most ambitious and fresh-minded university president can do little to change these moated duchies; neither can he take much money away from their budgets to start something new. If he wants to experiment with black studies, or an institute of urban affairs, he has to find new money from the outside – a tough proposition in these days of shrinking appropraitions and alumni contributions. Moreover, he cannot count on the support of the entrenched faculty for any innovation he attempts. Their first loyalty runs not to him or even to the university, but to their own disciplines and to the departments where they are practiced. The way to get ahead in their world is to write research papers or books which will establish them as Coming Men in their fields, and thereby win them offers of better jobs at more prestigious instiutions. Often they don't give a damn for the university where they happen to be at the moment,

much less for the students they are supposed to teach. And they may see any innovation as a threat to the relative improtance of the old departments, a drain on money which might otherwise have gone to them. A distinguished dean of a major state university recently remarked to me that "any real reform of higher education has to begin with abolishing the tenure system." That, he added, is almost impossible because the professoriat would fight it to the last drop of blood. He did, however, think that a start might be made by hiring new faculty members on five-year contracts, subject to renewal, rather than giving them permanent tenure.

"Would you like to write an article about that?" I asked.

"Good God, no," he said. "My colleagues would never forgive me. Besides, I'm on tenure myself. To be consistent, I would have to give it up – which I'm not about to do."

Weidner has not been able to escape the tenure system and its accompanying incubus, the compulsory Ph.D. union card, since they are built into the University of Wisconsin network, including Green Bay. But he has been able to sidestep (so far, at least) most of their evil consequences.

Because this university is new, it has been able to hire tenured professors who are young, enthusiastic, and daring enough to take a chance on an experiment which ignores the safe, worn ruts of academic advancement. In choosing them it has, in Weidner's words, had "little concern with the field of a professor's Ph.D. . . . but much concern with the kinds of ecological problems on which he wishes to focus, along with students and members of the community." (That last, seemingly perfunctory phrase conceals an explosive idea, to be noted in a moment.)

In addition, Green Bay foils the tenure system by means of "lectureships" – job slots in which it can place anyone whose experience is useful, even though he hasn't got a Ph.D. or climbed the prescribed rungs of the academic ladder. Such lecturers include many people from the local community – businessmen, town planners, conservationists – who not only lecture, but also sit in with the permanent faculty in planning courses. Some of the teaching also is done by short-term visitors, who come for a single lecture or for several weeks or months to work on a particular ecological problem.

But the most ingenious defiance of The System is the way Green Bay is organized. It has no departments of the conventional kind, controlling budgets, hiring, promotions, and courses of study. Instead the university is organized into four "theme colleges" and one school of professional studies, each granting its own kind of degree. A student, moreover, does not "major" in a traditional subject, such as chemistry or economics. Instead he concentrates on an environmental problem of his own choice, and (in consultation with his faculty advisers) selects whatever courses may help him in mastering it.

For example, if a youngster is seeking a degree in the College of Community Sciences, he might decide to concentrate on regional planning. The problem that interests him is: "How should the Lake Michigan District – nine counties in the northeastern part of Wisconsin – plan its future development?" To come up with answers, he will have to learn a good deal about economics, geography, political science, and sociology; and at some point he may find he needs some training in statistics and the use of computers. Much of his work will be done in the field, with residents and public officials of those nine counties.

If, instead, he is interested in problems of water pollution – a matter of deep concern in that region – he would enroll in the College of Environmental Sciences; and in trying to solve the particular problem he is concentrating on, he probably would dig into chemistry, hydrology, geology, and some aspects of engineering.

More than any university I have seen elsewhere, Green Bay is integrated into the surrounding community. Traditionally, research, teaching, and "extension work" or "community outreach" are regarded as separate – and sometimes hostile – enterprises. At Green Bay they all meld together.

How this works can be observed at Lake Noquebay, the main asset of Marinette County. It attracts much of the tourist trade, the county's chief source of income; and the lake is sick. It is showing symptoms of eutrophication, or premature aging. Water weeds are growing so fast that they discourage fishermen, who are getting fed up with snagged lines and clogged propellers. Besides, swimmers occasionally break out in an itchy rash which may (or may not) be caused by a tiny parasite which burrows into their skin.

This presented an ideal problem for the university's environmentalists. They are now trying to find out what causes the lake's troubles, and how to cure them. The undertaking combines scholarly research, teaching, and cooperation with the people of Marinette County to rescue their economy, all at the same time. It also demands a multidisciplinary effort – the joint work of scholars in several fields – which is one of the distinguishing characteristics of the Green Bay experiment.

Thus the Noquebay project is directed by T.W. Thompson, an aquatic biologist. His faculty helpers include an analytic chemist, an economist, a water-recreation specialist, a terrestrial biologist. a political scientist, and a marine geologist. Eleven students are now working with them, and others probably will join the group from time to time. Within a year or two they hope to have two end-products: (1) a plan for the future management of the lake and its surrounding land; and (2) data which may serve as a model for similar work on other ailing lakes in the North Central states and Canada.

Such multidisciplinary undertakings often get lip service at the traditional universities, but they seldom come to much. For under the established system, a faculty member earns no academic Brownie points for this kind of enterprise. His department will regard it as time stolen from research in his own narrow specialty; and as soon as he realizes that his career may be endangered, the prudent scholar will drift away from the multidisciplinary project, however urgent and innovative it may be. The Green Bay professors may also suffer. An economist who spends a couple of years poking around a lake, instead of writing abstruse little papers for the professional journals, may not get so many job offers from other institutions. But so far the Green Bay faculty seems willing to accept this risk, as a small price to pay for the chance to take part in an exciting experiment.

Indeed, Weidner makes it plain that the teachers on his campus will have to sacrifice a lot of academic sacred cows and customs. At a breakfast meeting with the faculty just before the new university opened its doors, he told them:

"We must give up the confortable old idea that professors meet their classes and post office hours (two or three hours a week) and then hide the rest of the week. . . . . Of course you must have formal office hours. But we are at the time now when we should be available to clock around. If a month goes past and you have not had any students in you home, then there is something worong with your approach to students. And if a week goes past and you have not had coffee with some students, of you have not got lost in some of our new people pockets with some students, then there is something wrong. . . . If any of us are uncomfortable with students outside the classroom, then we ought to find another job, because the time is gone when higher education is a thing that takes place in the class-room."

This, I take it, is precisely what thousands of students across the country have been trying to say for the last ten years, only to find that practically nobody was listening.

People pockets? Yes, they are a unique feature of the architecture of the university buildings now going up along the shore of the bay – an architecture as remarkable as the academic plan. Because the Wisconsin winters are pretty severe, the three main buildings are linked together with passageways. Byt these are nothing like the straight eight-foot corridors which make hospitals and office buildings so dreary. The follow the terrain, at some points running underground, at others with windows opening on sunken gardens. And every few yeards one side or the other of the passageway broadens into a little alcove, with a low table and few easy chairs – a "people pocket" where students and faculty can stop to talk, sip a Coke, study, or just rest. The name is a little too cute for my taste, but as a device for encouraging easy, informal interaction among students and their teachers, these pockets are proving highly successful. Nice places for courting, too.

The architecture and site planning of the campus deserves an article of its own, and I hope Ada Louise Huxtable will write it one of these days.

The University has no football team. Two Green Bay teams would cause nationwide confusion. Besides, big-time football, at the prices undergraduate stars command these days, is too expensive for a fledgling institution with many demands on its bankroll. So Weidner & Associates have encouraged soccer – the most popular of sports in nearly all countries except America. It seems to be catching on nicely at Green Bay, and at minimal cost.

Electronic teaching is being developed at Green Bay more boldly than at any other place I know of. Its four campuses, scores of miles apart, made this almost a necessity. Last November, professors on the main Green Bay campus began lecturing not only to their own classes, but to students on the Marinette campus fifty miles to the north, using a closed-circuit television hookup provided by a grant from a local firm, the Ansul Company. Later, it may be extended to the Fox Valley campus to the west and the Manitowoc campus to the south. Meanwhile, the latter two get video tape recordings, and their students can take part in group discussions of each lecture with students on other campuses by means of a conference-line telephone network. The resulting economies are impressive. In the pilot project, a freshman course in social environment, six instructors taught some eight hundred students. Their lectures were recorded for use in future years – or for review by any student who thinks he missed something the first time.

In addition, the university has a Media Library which vastly extends the possibilities for independent study. There a student can check out a portable television set and take it to a study carrel, along with video tapes on a wide rage of subjects. He also can borrow language records, audio tapes, filmstrips, and cassettes, for use at his convenience; and if he is slow to grasp something he can replay that segment as often as he likes. Some of this material is produced in the library's own television and recording studios, but much of it comes from other sources. For example, a single page of its catalogue lists ten Encyclopaedia Britannica films on the human body – "The Heart in Action," "The Perception of Sound" - plus items on caste in an Indian village, mollusks, tundra ecology, Samuel Beckett, and the behavior patterns of a one-year-old child. In length they range from an eight-minute film loop to an hour-plus "documentary report on one woman's step-by-step recovery from mental illness."

With faculty guidance, a student could get a pretty thorough (though lonesome) education in the Media Ligrary alone, working at his own pace and without ever stepping into a classroom. One of the librarians pointed out another advantage.

"Machines," he remarked, "don't have tenure. We can replace anything here as soon as it gets obsolescent."

This may give the impression that learning at Green Bay is mechanical and dehumanized. In fact, it is so personal and student-oriented that, in comparison, the old-fashioned universities seem to be operated for the convenience of the faculty. From the day he arrives, a student finds all the individual counseling he wants, on his studies, personal problems, and future career. Remedial work, usually on a tutorial basis, is available if he needs it. If he is bothered by the usual grading system, he can, in most courses, ask to be marked simply "pass" or "fail." When he feels that he already is well prepared in a given subject, he can ask for an examination and, if he passes, get full credit even though he has never set foot in the classroom. Required courses are few, and honors students automatically are exempted from them.

Normally, however, every student takes part in a Liberal Education Seminar during each of his four years at Green Bay. These seminars, of twelve to fifteen students each, are intended to link their specialized studies with the broader problems of society, its value systems, and the environment. They are conducted largely by the undergraduates themselves, though one or two faculty members usually are standing by to answer questions or, when necessary, to nudge the discussion back on the track.

In the sophomore year, students are encouraged to take on off-campus projects – part-time work in a local paper mill, perhaps, or a job in a reformatory, a day-care center, or a poverty program.

Juniors are expected to get some experience in a culture different from that of the Northern Great Lakes region. Depending on their interests, they might spend a few months on a campus in another part of the country, on an Indian reservation, or traveling with a small group of students and faculty members in Europe or Latin America. The purpose, in both years, is to make sure that their academic work is intimately related to the outside world, As one professor put it, "By the time he leaves here, we hope a graduate will not only understand the ecological crises the world is facing. We hope he also will have decided what he can do to help solve. them."

There is no space here to give even a superficial account of other innovations at Green Bay – how literature, history, philosophy, and the arts are taught in the College of Creative Communication, for example, or the College of Human Biology, where the offerings range from population dynamics to preprofessional work in medicine.

Neither is this the time to attempt an evaluation of the experiment. Until the university has had at least five years of operation, nobody can guess how its promise acutually will pay off. I can report, however, that all of the faculty members I talked to were both enthusiastic and confident. And among the students I could detect none of the disgruntlement or resigned cynicism which are so evident on many campuses. So far, Green Bay has had no bomb scares, sit-ins, or demonstrations. Whether this will remain true when the present enrollment of less than three thousand students at the main campus rises to an eventual twenty thousand is another question. But the present crop of undergraduates seem to consider themselves lucky; and I think they are right.

ECOLOGY – HEART OF OUR UNIVERSITY PROGRAM

Edward W. Weidner
Chancellor, the University of Wisconsin - Green Bay

My article will describe how one institution of higher education – the University of Wisconsin-Green Bay – is responding to the environmental crisis by giving an environmental focus to its whole curriculum. We believe that if such a focus is to have a real impact on a national basis, many other schools at all levels must turn in the same direction. We do not suggest that other schools can or should copy directly what we are doing, for what each school does should be related to its own community and region and to the human and physical resources available to it.

The University of Wisconsin-Green Bay is a new institution. It was three years in the planning – from 1966 until 1969. We occupied our new main campus and launched our academic plan in the fall of 1969. Superficially, UWGB may appear to be like any other institution. We train chemists, biologists, physicists, and mathematicians. We train business administration specialists elementary and secondary school teachers artists, musicians, and actors. A student may select a foreign language, English, philosophy, or history. And all of the social sciences can be found in our course list.

The fact that much is familiar at UWGB is an important point ot emphasize in an era that tends to emphasize the innovative and experimental. Every person who is going to be a responsible citizen of any modern society must master basic intellectual skills. In addition, may of our citizens need to master certain specialized skills. The question of critical social importance to which the UWGB academic plan particularly addresses itself is how each individual chooses to use the skills that he acquires.

As never before, our country and the world need citizens who are committed and dedicated to improving the lot of mankind. At UWGB, we are seeking to inculcate in all of our students a lifelong attitude of concern for the environment, its preservation and its improvement.

Our aim is to relate every part of our program to the ecological crisis. Whether it is teaching, research, or community outreach, the focus of the university remains consistently that of helping student, professor, and community member to live in greater harmony with the environment and to *do* something constructive about the problems that beset it.

To carry out this mission, we must relate daily and directly to the people and to the other institutions and agencies of our community and region. Our students and faculty members must interact with the people of their community in identifying, investigating, and seeking solutions to the problems of their common environment, Conversely, we want the people of the community to think of the campus as a place where they and their ideas are welcome and where they can obtain resources and guidance. We have devised the label *communiversity* to describe this close reciprocal relationship and are doing everthing we can to make UWGB a true communiversity.

Two fundamental ideas, then, determine our institutional direction: a focus on man and his environment, and the concept of the communiversity. In order to implement these ideas we are forgoing and educational program that in a number of ways is different.

First, a true reciprocal relationship is developing between UWGB and the northeast Wisconsin region. Students and professors study, observe, and work in the community as well as in university classrooms. In turn, members of the community come into the classroom and interact with faculty and students. The teaching approach emphasizes problem solving and decision making in the context of relevance to environmental problems.

Second, teaching, research, and community outreach merge into a single intellectual function, as they must if we are to deal effectively with the pollution of a river, the decay of a downtown urban area, or any of the

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dozens of other environmental problems found in our region.

Third, a focus on ecology and communiversity requires extensive and frequent contacts between faculty and students outside the classroom as well as inside. It means a joint search for solutions to some of man's most urgent problems.

Fourth, students must take considerable initiative for their own learning. They mucst become skilled at sorting out their values clearly, indentifying the major problems, and then getting enough information to develop programs of cooperative action to solve the problems.

Fifth, the primary focus of the curriculum is on environmental problems, rather than on individual disciplines and professional fields. UWGB recognizes and teaches the disciplines, but curriculum control is centered at an interdisciplinary level. Broadly defined environmental problems provide the focal points both for facult organization and budgetary planning.

The UWGB student selects one of these environmental problem areas as the center of his intellectual interests. It may be a problem of the biophysical environment, such as environmental control in regard to air, water, land, natural resources, or environmental engineering. It may be a problem associated with social process, such as urban decay or regional planning. It may be one involving population dynamics, the ratio of available food to population, or the effect of environment on human development. It may deal with the matter of human identity and the many diverse aspects of human communication and action. If none of the formally defined problems satisfy the student, he may select an environmental problem of his own devising.

The environmental problem that the student chooses then becomes the central point of relevance for his program. He picks courses in the various disciplines and professional fields that contribute to thinking, problem solving, and decision making in connection with the particular enviromental problem. Thus chemistry, art, secondary school teaching, psychology, or whatever subjects or activities make up his course program have new and exciting meaning for the student. They are means to a social end; they relate to one another, as well as to the environemtal problem. The student learns to see the world outside the university as being fully as relevant to his learning objectives as the world of books, lectures, and discussions inside the university.

We think of UWGB as a new institution for a new age – the age of the environment. But a single institution, by itself, can have only very limited impact on the enormous problems that characterize this new age. Fortunately, during the past year, concern for the environment has become a popular theme throughout American society. Last spring Earth Day captured the attention and the energies of millions of students at all levels of the educational system and also involved many adult citizens.

Many colleges and universities have added courses, institutes, centers, and seminars dealing with one or more aspects of the environmental crisis. The Congress and many state legislatures are beginning to piece togherther a new body of environmental law. Industry and government have begun to face up to the implications of their activities that pollute the environment.

This is all to the good, but it is only a first step. If wer are to deal effectively over the long run with environmental problems, we must devise a coordinated network of institutional approaches. In many instances, of course, this will involve changing the orientation of existing institutions. Such changes are never easy and will require corresponding changes in the attitudes and goals of the people who make the institutions work.

The logical place to begin is in the educational system, particularly at the early levels where goal perception and attitude formation begin. We at UWGB are well aware of the need of developing a comprehensive plan for environmental education, starting at the preschool level and continuing through the elementary and secondary grades and on into all of the educational institutions above the secondary level.

Some time ago the Johnson Foundation of Racine, Wisconsin, became independently aware of this need. Recently UWGB and the Foundation agreed to pool some of their resources to begin practical study and field work for development of an environmental education curriculum for the K-12 grades. A three-year grant by the Foundation will cover a large portion of the salary of the full-time director of this project. We will need – and can get – substantial additional funding outside the regular university budget to carry out the project.

It is still too early to describe the project in any detail, but the current intention is to involve a number of public and private elementary and secondary schools in Wisconsin in the planning, preparation, and evaluation of curriculum materials. There will probably be teacher workshops, and certainly there will be an increasing interchange of ideas on this vitally important subject between the university and the school systems of the area.

With the support of a grant from the National Audubon Society, and in cooperation with the U.S.

Office of Education and the Wisconsin Department of Public Instruction, UWGB is holding a national conference on environmental education on December 3-5. We expect this conference to generate guidelines and goals that can apply to our long-range environmental education project.

As one who has been intensively involved in the creation, staffing, and operation of a university that has man's environment as its single, strong focus, I am probably prejudiced. Nonetheless, let me express my profound conviction that every educator should be asking himself what he can do personally and professionally to help reverse the massive trend toward environmental degradation, a trend that threatens the entire life-support system of our planet.

MAKING TOMORROW NOW

Matthew J. Brennan

In the United States today, we are rapidly approaching a crisis in which men will struggle for space in which to live and play, air fit to breathe, and water fit to drink, not to mention food uncontaminated by poisons and additives. And as in all social crises of the past, the American people are turning to education for solutions.

Yet for reasons that elude under standing, education is not prepared to offer solutions. Although our heritage as a nation is closely bound to the outdoors – to the natural environment – our educational system does not reflect this tie. Where the environment has been studied, man has not been considered as a part of it.

In developing a strategy for education for an environment of quality, let us make one major assumption. If man is the only living thing which can consciously transform, manipulate, control, preserve, or destroy his environment, then a knowledge of *how* he affects his environment and, perhaps even more important, of the *consequences* of his actions should be an essential element of human understanding. It is not, and the reason it is not represents a failure of American education.

Environmental education is that education which develops in man a recognition of his interdependence with all of life *and* a recognition of his responsibility to maintain the environment in a manner fit for life and for living – an environment of beauty and bounty in which man lives in harmony. The first part of environmental education involves development of understanding; the second, development of attitudes – a "conservation ethic."

Understanding the environment and man's activities in it certainly involves the sciences. Indeed, an understanding of the chemistry, geology, physics, and biology of the environment is basic. But many scientists have themselves learned that decisions regarding man's actions in and use of his environment and its resources are not always made on the basis of scientific knowledge. We have the knowledge to solve most of the new environmental problems. But decisions a being made, and will increasingly be made, on the asis of social desirability, economic feasibility, or political expediency. The social sciences must, the fore, also be an important segment of environmental e ucation. And since natural beauty, esthetics, and e ennobling elements of the environment are rece ng increased attention, the humanities must come with n the purview of our program.

Most important, we can no longe segment our subjects. Discussions of population, pestic es, pollution, and poverty of the environment are by nature interdisciplinary. How can you separate e scientific, religious, and social aspects of population the scientific, esthetic, and social aspects of resource us the scientific and esthetic aspects of wilderness preserva on?

We are really talking, then, about new kind of education: *education for the total envi onment.* This involves understanding of the *external* en ronment. But if we are to accomplish the second part of environmental education – the development of a "cons vation ethic," an attitude of responsibility for the envir nment – then our education must involve the *inner* envi onment of the child as well.

Life styles and attitudes are formed t an early age. The reasons why people "conserve" are internal, and we will fail if we do not develop in children a good inner environment. Why should the child who has not been conserved be concerned about wilderness, California condors, or Antarctic penguins? Where is esthetics taught in our schools?

WHAT WE MUST DO

To attain our objective – education for the total environment – we must develop *total environments for education.*

Obviously, the most efficient laboratory for experiences in search of meaning in the environment is the environment. Yet in most schools, every element of

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the school facility but the surrounding environment is used. Teachers are trained to use textbooks, guides, machines, media equipment, indoor laboratories – but never the real laboratory just outside the school. In most schools, the teacher is discouraged from using the surroundings as a laboratory. He can make TNT in the laboratory, without parental permission, and be fully covered by insurance if the school blows up. Yet if he wants to take his class outdoors he needs both parental permission and insurance against injury. Is it any wonder the average American know little about his environment?

The outdoor laboratory must become an essential element of every school facility, extending eventually into the community. Here learning can go on naturally. Here the child can fail without penalty – and learn from his failure. Here he can become part of his environment and his environment a part of him – it will conserve him; he will conserve it.

What environmental understandings are we talking about? Three great conceptual schemes govern all of life on earth, including man: (1) Living things and environments are in constant change. (2) Living things are interdependent with one another and with their environment. (3) Living things, or populations of living things, are the product of their heredity and their environment.

Although these concepts are complex in nature, and understanding of them and their relationship can be developed quite simply, in this way:

Since man is the principal agent of change in the environment, we can look for rapid changes as a result of his activities. Children can be taught to look for change. *Change* results in a new environment; when man adds poisons, builds dams and roads, or kills predators, new environments are created. Now we must look for *consequences,* since all living things are dependent on their environments. What effect does the change have? Can we predict it? Did we foresee polluted water from detergents that gave us the whitest washes in the world? Did we foresee DDT in the tissues of Antarctic penguins when we sprayed the farms and forest of America to control insects? We must expect consequences when new environments result from change.

Finally, we must try to determine how living things will survive in the new environment. Not all living things are adapted for life under changed conditions. Our list of endangered species is long. Perhaps man may be on the list; some scientists believe so. Can man survive the pollution, poisons, crowding, noise, etc., that he has introduced into his environment?

Educators must believe that education for these three basic concepts of life on earth will give man the understanding necessary for his life as a member of the planet earth environment. Through their efforts to develop programs of education for the total environment, America's teachers hold the key to the future of man's environment.

PERSPECTIVE

"For some cry 'Quick' and some cry 'Slow',

But, while the hills remain,

Uphill 'Too–Slow' will need the whip,

Downhill 'Too-Quick' the chain. . . ."

– Alfred, Lord Tennyson
1809 - 1892

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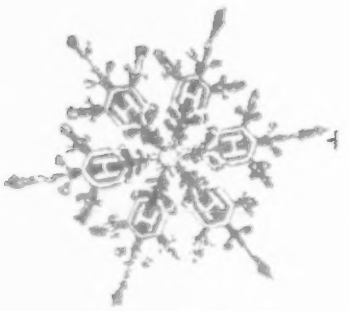
PERSPECTIVE

- Microcosm Of The "You" In U.S.A.



(Natural History Magazine, published by the American Museum of Natural History, conducted a poll [June-July 1970] of its readers on "You and the Ecology Movement." Here is a cross-section of the "Letters to the Editor" which resulted. The Editor cautions that his readers are already pre-oriented to the environment issue – or they would not be subscribers. Reprinted by Permission ©)

The Questionnaire

Your questionnaire for readers of your magazine was most interesting and thought provoking. We have made several copies and have distributed them to other workers.

Your suggestion that the ecology movement, black power, and the "students rebellion" are interrelated is very disturbing to me. I think they have little or nothing in common except a feeling of urgency and frustration. The enemies of the ecology movement are trying to promote the idea that we are trying to promote the idea that we are just another bunch of radicals. On the contrary, we never see the hippie types in the woods.

Birmingham, Alabama

I heartily approve of your study of the ecology movement. However, in my opinion your questions are difficult to answer. For example, my emotional reaction is somewhat different, in some cases, from my weighed reaction.

Flagstaff, Arizona

This questionnaire seems to be of a higher caliber than the usual stilted type. However, there are still a couple of questions like "When did you stop beating your wife?"

Yonkers, New York

I feel your questionnaire is much too limited in scope, and perhaps slanted to those who make a lot of noise but have never picked up a beer can. I feel that the "ecology movement," as you term it, has far greater significance than your surface treatment would indicate.

Bedford Hills, New York

Gerlach and Hine may be hell on wheels as anthropologists, but either their bias shows or they are lousy "objective question" developers. The questions have no place for a person who can see both sides of the question. The reader is assumed to be committed to all-out conservation or all-out despoliation.

I am afraid that the big emphasis on "ecology" (seldom has a word been more misused) will be followed by a letdown which will negate any gains won by the current "hard-sell." Too bad we cannot be moderate in all things.

My wife agrees with me, so I know I am right.

Grants Pass, Oregon

Thank you for putting out this questionnaire. It helped sort out some of my own thoughts on these matters!

Moraga, California

Saving the Cheetah

In the current issue of your excellent publication is a questionnaire relating to an anthropological study of the ecology movement, a subject which reaches me both as an anthropologist and a zookeeper. I wanted very much to submit this questionnaire, but was disturbed by the necessity, in doing so, of mutilating the delightful photograph of a female cheetah and young which accompanied Dr. Schaller's article beginning on the reverse side of the page. I elected to submit the completed form, but I will always regret the defacement of one of my copies of NATURAL HISTORY.

Houston, Texas

If you think that I'm going to cut up my issue of NATURAL HISTORY to answer your questionnaire, you are out of your gourds. (Besides, the cheetah on page thirty is already rare enough.)

Woodbridge, Connecticut

The printing of the questionnaire on the reverse side of an interesting article is a small example of the

incompetence of so-called leaders that is so common in American society. This one factor is the greatest stumbling block to the solution of important ecology problems.

Jamaica, New York

My copies of our beautiful magazine pass along to one family after another until they eventually wear out or wind up in school to be shared as widely as possible. Imagine the consternation of my chain of readers at finding half a page torn out, half the photo of the critters on pages 30-31 denied them.

Not everybody has a machine handy to copy things and avoid mutilation of originals. Why couldn't an insert such as the enclosure be used, instead of your method which forces most readers to commit mayhem?

If you have nobody around to stand guard against iniquities of this nature, I will be glad to serve as anti-atrocity editor for a retainer of 5c a year, paid in advance.

Mount Clemens, Michigan

An Old Story

I have been "conservation minded" for 25 years. Suddenly, it is popular! It would appear that persons with serious personality "fractures" have found another cause in ecology.

Lawrence, Kansas

The way we now feel about the environment is how we've always felt – the difference is that now other people don't think we're so nutty to want to have nice areas to sit and look at birds, etc.

San Diego, California

I've been an ecofreak for 30 years.

Winchester, New Hampshire

I have always lived close to nature and supported conservation. I would starve before living in a large urban center.

Nederland, Colorado

I am 82 years old and have passed the torch.

St. Louis, Missouri

What to Do?

A good number of us have been concerned at the decreases in bird, animal and fish life in our Everglades and in our coastal waters. Some have been active in their protests, but the government keeps on doing what it wants – and conservation is ignored.

Please, if you can suggest an active way for us to participate in our environmental improvement and the whole ecology, I would appreciate hearing from you.

Palm Beach, Florida

I would like to know how I might be of assistance. What can I do? After all, I am a big, fat nothing as of now. I would like to contribute something worthwhile before I die.

Washington, D.C.

A Feeling of Hopelessness

I personally do not think the environment can be saved. Man, in my opinion, is too egocentric to pay the price in time; therefore, I'm about to switch from an active to a passive role.

Elpaso, Texas

What's the use of trying? Ever try to stop strip mining?

West Liberty, West Virginia

The more I see incompetent young people refusing to learn the necessary hand skills, scholarly discipline, and historical and scientific knowledge, and resorting to foulmouthed criticism as an all-purpose remedy, the more disheartened I am to see that my 30-year commitment to a cleaner, better, happier world was a hopeless dream. I wish I had spent my life indulging myself instead of working and stydying and paying taxes.

Bloomington, Indiana

I have a sense life is over and although I fight, I really wait to die. Regressive selection has gone too far with man. We should have never gone beyond food gathering.

I use work as a drug. I farm part-time. I live on a personal basis. I belong to nothing.

Coopersburg, Pennsylvania

I personally believe it is time for man to leave the earth; he is more a destroyer than a builder.

Let earth renew itself.

Bronx, New York

I think it's making me neurotic.

Baltimore, Maryland

Ecoaction

I am no longer content to sit by and say "you can't do anything about it because everybody does it" – in other words – you can fight City Hall.

New York, New York

I now refuse to cooperate with police, serve on juries, show respect for public officials, and pay local or state taxes on which I can cheat. I trust nobody connected with the law: judges, lawyers, etc. All because I was kidnaped by the local Gestapo for protesting noise pollution to the very public officials creating the din. I was put in jeopardy; subjected to slander, vilification, obscenity, and intimidation by court officers; sold into frame-ups by shysters I hired to represent me; subjected to prejudice by courts; and once beaten by a cop. I have asked for justice everywhere, but it seems, you can't fight City Hall. Mostly, I have no competent lawyer and can't find one.

Bridgeport, Connecticut

I tried in 1936 to get a good sewer system but was defeated by two votes. Now it has been done, so in the end we win, I believe. Now, 34 years later, it is passed. Hurray!

Harrisburg, Pennsylvania

Though I am blind, association with ecology groups has given me greater incentive to go on, and association with the people in them has given me new values.

Bell, California

There has been considerable reduction in what is considered "normal'. social activity. I find the animals much more interesting than most people.

Laurel, Maryland

I shout at slobs that I catch littering and polluting. (I'd shoot them if it were legal.)

Santa Monica, California

I no longer use any colored paper and I waste a lot less and think a lot more when I do. I lecture all the time. I keep dreaming of bombing Con Ed.

Bloomfield Hills, Michigan

My profession is law. I have chosen to exclude myself from professional employment involving causes which are antithetical to the goals of the movement.

Los Angeles, California

I boycott products that are high waste producers. We've given up hunting and fishing.

Longview, Washington

After obtaining a B.S. in engineering, I have abandoned my intention of seeking my M.S. in thermodynamics. I have decided on an extra year of undergraduate work in biology and graduate work in ecology and/or environmental engineering.

Los Angeles, California

I'm starving because I left a good job to return to college and get a degree in environmental health. I quit using DDT and other sprays except the unstable kinds. Quit smoking and burning trash outside. Quit hunting.

Kingsport, Tennessee

I am an immigrant and a successful artist. But at the age of 37 I enrolled at Hunter College School of General Studies to study biology and psychology. I inted to become a biopsychologist and spend the second half of my life working on environmental and behavioral problems. I have no children (I am sterilized) and plan to move out of New York City to a more natural environment (Midwest?). We have no car, don't buy "no return" items and have convinced my laundry service not to use plastic wrapping. I never buy fur coats. I keep plants fofor pets. And it seems that many friends of mine are following the example.

New York, New York

I resigned from a $12,000 position as a research chemist engineer to work for next to nothing in the movement.

New Orleans, Louisiana

Upon retirement within a few months, I plan on spending all or near full time with or without pay on antipollution work, believing that pollution can best be eliminated at its source.

Livermore, California

Our own plan is to develop a small area of watershed land (15 acres) into a game protection area within a heavy farming community, by reforesting and planning food and shelter areas. We hope we can donate this area – to be retained in this state – to an agency which will insure its safety as such.

Littlestown, Pennsylvania

For 39 years I have lived in a forest that in late years has become a real estate development dream. I have resisted successfully. If I don't die soon I will have trouble with taxes.

Houston, Texas

I own and protect a 3,00-acre mountain cove (with farm in bottomlands) against hunters and despoilers – and the usual careless damned fools.

Mill Spring, North Carolina

After careful evaluation of the total situation and the complete frustration involved with attempting to change individual man – let alone society – I slowly became a socalled hippie. Last October I closed my professional office, moved to a reasonable degree of country, and became a student of life.

As I watch this society destroy itself, minority groups within it, other countries and their people, and the environment of the entire world, I feel the total frustration of attempting to effect a meaningful change by nonviolent means – the only meaningful answer seems to be to stop supporting the system. This is why I stopped working, paying taxes, and buying things I do not absolutely need. I also use feet or a bicycle instead of a car.

Point Reyes Station, California

I have chosen a life style of subsistence farming, without use of electricity, automobiles, phones, etc., – communal in Maine.

Richmond, Indiana

I live communally in an ecologically concerned community (Synanon). I try to minimize use of unecological products such as plastics, coated papers, detergents, etc. I have stopped polluting my own body with caffeine and chemicals as a personal demonstration.

Santa Monica, California

My conservation practices have intensified. However, most significant changes in my life style are attributable to my life as a nudist (10 years).

Greenville, North Carolina

Studying and learning the parameters of the environmental problem begins to consume most of my leisure time; I have cast off my GNP-oriented consumer attitudes; socially I seem to be suffering the results of a king of xenophobia – in my own country!

New York, New York

I now bring up the problems of pollution, etc., to all clients for whom it is relevant (I am in the advertising business). I urge them not to treat it as a public relations problem but to do something about it.

Englewood, New Jersey

We now try to buy only returnable bottles and detergents that break down in water. My wife has decided not to purchase a fur coat, which prior to this was one of her main objects to acquire.

Monticello, New York

I now question the motives of conservation writers and adherents.

Menlo Park, California

I will not but anything made of sealskin, alligator, or from the fur of wild animals. I truy to buy soaps, which add the least pollution. I am most conscious about littering, and have fought the use of DDT since I had DDT poisoning some years ago.

New York, New York

I have completely given up suing detergents even for dishwashing. Save water; save electricity. For the past 4 years I have kept local mosquito control sprayers with their damned DDT off my 6-acre place.

Leonardtown, Maryland

The ecology movement has affected me to the extent that where before I would think nothing of littering, I now never litter, and pick up litter I see on the street. I also speak with people who wear ecology buttons and still litter – the damn hypocrites!

West Hurley, New York

Ecoconversions

In the last few years I have had a gradual broadening of my outlook. I have changed from "leave well enough alone" to "let's get the facts and see what we can do."

Bronz, New York

My life has been changing in the last year and conservation and ecology are affected, but I have been close to nature all my life. I have become a vegetarian and practice yoga; I have found more inner peace and awareness of God.

Spruce Pine, North Carolina

I am much more aware and concerned for my environment. I was once shy, but am now constantly

talking to people young and old about our problems. For once, I became involved in something I believe in!

Westbrook, Connecticut

It changed me from an overly polite, mild-mannered, non-joining introvert, to a brash, aggressive, "nothing is too big to tackle" extrovert. It also made me realize that good government is up to me.

New York, New York

I was a happy bird watcher. Now I am an unhappy conservationist. I am interested in very little except nature, conservation of what wilderness is left, preservation of wildlife, and a clean and healthy environment. I write hundreds of letters.

Beaumont, Texas

Involvement has been minimal, but for the first time in my life I have written letters to government officials, namely Secretary Hickei about the Everglades. I have written for a list of detergent low in phosphates, and am determined to use as little of such detergents as possible. I have shortened my skirts so as not to be mistaken for one of the dismal, silent majority. My efforts have been small and personal.

Polk ,Pennsylvania

I have gone from the typical gray flannel suit city-type to an informal, longer hair "outdoor" type.

New York, New York

Awareness combined with anger has caused me to involve myself through letter writing and phone calls to industrial polluters – we are not group joiners, but the crisis may force us to be.

Allston, Massachusetts

The Automobile

I am doing without as many man-made products as possible. I do not own a car and am violently opposed to the automobile and all it has done to ur society and our morality as a people.

Washington, D.C.

We are bad for the economy – with relish. I drive a seven-year old, perfectly turned, four-cylinder car (31 miles/gallon).

Berkeley, California

I now ride a bike to school. I haven't been in a car since April 3 (59 days).

New York, New York

I am anxiously waiting for the practical electric car, one that can go more than 50 miles before being "plugged in."

Moosup, Connecticut

Every day I wish for the down-fall of the combustion engine.

Woodland Hills, California

Economic System

I eat mainly organic foods, avoid driving buy only secondhand clothes and furniture, and generally try to avoid supporting the U.S. economic system.

East Hartland, Connecticut

Involvement in ecology is an involvement in life and the will to live without the threat of imminent destruction. Involvement in ecology is involvement in messy politics and a need for revolutionary changes in U.S. economic and social life.

Pacific Palisades, California

The vast majority of Americans believe very much in our present private enterprise system which has given us the greates good for hte greatest number of people in history. I feel that any publication which draws erroneous associations regarding our system will eventually harm itself.

Los Angeles California

I now prefer to be in the mountains rather than the cities; I no longer believe in progress and the American Dream.

Chicago, Illinois

To us, it is not a matter of this economic system being good and that one being bad, but rather that man makes an economic system either good or bad in his application of ot.

Salford, Pennsylvania

We are totally pessimistic for the long range. This society is one of greed and selfishness, and by the time it hits the pocketbooks of the greedmongers it will be too late.

Canton, Missouri

I am in my sixties and perhaps overly pessimistic. I do not think man is going to make it.

The Third World and socialist countries feel that antipollution devices are too expensive and will impede their construction programs.

The capitalist countries put immediate gain above ultimate good. I receive all sorts of business trade journals. They agree that some antipollution devices will become mandatory, but advise "play it cool Jack," just do the bare minimum to get by.

Let's not laugh at the dinosaur. He lasted, was it one hundred or two hundred million years? We have been here – two million? If man survives for two more centuries it will be unforeseen by me.

Los Angeles, California

The great drawback in all antipollution is that it costs money to avoid pollution – and people aren't willing to pay more for a product that is made without pollution than they would for the same product made cheaper by easy disposal of the pollutant.

Glens Falls, New York

The problem of pollution will be solved by those agencies and individuals who are able to do things differnetly than they presently are and by individuals who are willing to pay the cost of more expensive services and higher taxes. Some of the worst polluter are municipalities, and the importance of the latter should not be overlooked.

Scott, Mississippi

Population Problem

I believe that *all* our present problems are directly or indirectly based on the population problem!

New York New York

I won't have more than 2 kids (watch me have triplet). I kind of think now that it's morally wrong.

New Haven, Connecticut

Even though I am a working mother we have eliminated the use of paper napkins, plates, cups, towels, tissues. As a Catholic family we have had a rift with the church over birth control. I quit a job working for an oil company.

San Diego, California

A serious study of the population crisis led my wife and me to resolve to have only 2 children even though I never got the girl that I wanted.

San Diego, California

My concern with overpopulation has hardened my attitude toward death, causing me to lose interest in life-saving medical research. I also feel there is on cure for human misery and inequity as long as overpopulation exists.

Danbury, Connecticut

I am choosing sterilization over any other form of birth control. I have undertaken conservative gardening practices. An increased awareness of conservation in all daily tasks – aimed at lessening all kinds of pollution. I bought GM stock to give up my automobile.

Binghamton, New York

I will not have children primarily because population is the direct cause of environmental pollution.

Anaheim, California

Beautiful People

I am less concerned with material things. I have feelings of exhilaration at times because so many good, beautiful people are backing the movement.

Bonners Ferry, Idaho

Can't we think, plan, discuss, or act without letting our hair grow and carrying a placard?

Studio City, California

Our duty is to the earth first, but to get there we must free ourselves from the oppressors! Since time is short, moderate and compromising measures do not change situations. Seize the Time, Off the Slime, Free Huey, The Panthers, Purerto Rico. Free Amerikkka. Liberation of all Third World People. Give the Earth back to Nature!!! Free the Anglo-Saxon from his binding puritanical beliefs. Learn to breathe, dance and sing.

New York, New York

I am not in any trouble-making movement and as a taxpayer I am tired of anarchy in this country. Nought is to be gained by it. If presidents following Lincoln had sent all Negroes back to Africa as Lincoln intended, such

rackets wouldn't exist today. Don't mess with strife – I served my country loyally and am enjoying my retirement writing a historical novel.

Los Angeles, California

I do not join organizations or follow leaders – I lean toward anarchy (classical).

Chicago, Illinois

I own and work in our own store and talk to the public if the occasion presents itself. I do not approve of radical groups. Each person can influence another to think on ecology if he will not use the horrible radical methods. The radicals are the filthy pollutors. Also, I believe, Communists.

Harrisburg, Illinois

Concern with population/pollution/environment tends to make one a revolutionary. I now devote more time, more thought, more money to these organizations than I did a year ago.

La Grange, Illinois

On the basis of considerable experience (as a university professor) with activist students I caution that ecology as such does not really interest the revolutionary but is being used as a convenient cause. The ecology movement can unite the country; to associate it with political revolution would be disastrous.

Collinsville, Oklahoma

Mine is a life style of change. I am a traveler. A yoga student. A photographer. A bum (I don't work for pay, but forlife). A writer. A karate student. A farmer. A lover of life (where nature is, so I am also). All these are part of loving life and nature.

No address

Getting Away

Have substituted a bicycle for a car. Am moving to New Guinea in October.

Downey, California

We prepare much more fresh food rather than buy tins, reuse all plastic; have decided that so little can be done in the United States that we are emigrating to New Zealand.

Berkeley, California

I am doing without many convenient items. Decided to have only 2 children. Use one small car. Also gave up in despair and am moving to Australia.

Jacksonville, Florida

We are in the process of becoming homesteaders. We feel that this is the only way in which one can truly have freedom of speech and action. All have adopted the motto, "Think small."

Franklin, Vermont

Having been residents of "suburbia" in New York for 22 years, chucked job, friends, and family and moved to a wilderness home in northeastern Vermont.

Springfield, Vermont

Echophilosophy

What is urgently needed is a revolution in values, and no sabotage or bombings will bring this about.

Wanwatosa, Wisconsin

I am less interested in material gain, physically more active, philosophically more active; educational and intellectual goals have changed, I spend more time off my tail and out in the field.

Califan, New Jersey

Maintain ascetic ethic with hedonistic violations.

Vancouver, Washington

I believe strongly in the oneness of all creation, and in the responsibility of each to all other; human, animal, plant, and inanimate.

Reno, Nevada

I have become more aware that I am as responsible as most other individuals for the causes of pollution. It has given me a much broader perspective of my vocation as clergyman.

Grafton, Virginia

I have altered my goals in life, have become less materialistic, have rejected Christianity and all religions; I am selling my large home to live in a smaller and more modest one.

Chester, New Jersey

I ride a bicycle whenever possible. I do not use air conditioning. I restrict my use of electricity. I pray regularly for the sake of the world. I have stopped

smoking. I use organic foods as much as possible. I restrict my use of pesticides, plasitcs, nonreturnable bottles, etc. I petition my government for redress of grievances. I contribute to ecology organizations.

I pray a lot for the world.

Philadelphia, Pennsylvania

The Next Generation

I am only twelve but I have attempted to answer your questionnaire. It's hard to get yourself involved with grownups but among my classmates, my friends and I have started an anti–DDT campaign.

Poughkeepsie, New York

I'm observant in watching people for littering or polluting. I don't let my brothers shoot any rabbits or birds. I scare them away.

Chicago, Illinois

I had once tried but failed to get involved with a group. Like everything else, I was more or less ruled out by the caste system. I'm only in the fifth grade and they were in the ninth.

Elizabeth, New Jersey

I am only a high school student, currently in the 11th grade, but I have been made aware of the crisis facing us through publications such as NATURAL HISTORY. Unifortunately, not all young people have access to such, or the interest.

What I'm getting at is this: more should be done to interest young people in ecology and conservation. Classes should center around these important themes, and student conservation groups should be encouraged. Many adults I have spoken to ab out this critical issue have the same idea: "Well, let these student pinkos do it; I'll be out of it soon enough, anyway." And kids say, "Let the establishment plant their cherry trees and harp about pollution." So wer're not getting anywhere with the ecological movement due to apathy and indifference on both sides.

This is why I say, please, try to get through to young people. And the older gerneration, too. No telling how long any of us will be here.

Carbon Hill, Alabama

PERSPECTIVE

Quo Vadis, humanus Americanus. . .?

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Lest You be Disheartened – See Yourself As Another Sees You . . .

America Is Finally Born Into History

By Henry Fairlie

British Journalist based in Washington, D.C.

Listen First to Jose Ortegga Gasset, the Spanish philosopher writing 1930:

"America is only starting its history. It is only now that its trails, its dissensions, its conflicts, are beginning. It has yet to be many things. . . . America has not yet suffered; it is an illusion to think it can possess the virtues of command."

Listen then to the Romanian philosopher E.M. Cioran, who lives in France, writing in 1956:

"America stands fegore the world as an impetuous void, a fatality without substance. Nothing prepared her for her hegemony; yet she tends toward it, not without a certain hesitation. Unilike the other nations which have had to pass through a whole series of humiliations and defeats, she has known till now only the sterility of an uninterrupted good fortune. If, in the future, everything should continue to go as well, her appearance on the scene will have been an accidnet without influence.

"Those who preside over her destiny, those who take her interest to heart, should prepare her for bad times; in order to cease being a supperficial monster, she requires an ordeal of major scope. Perhaps she is not far from one now. Having lived, hitherto, outside hell, she is preparing to descend into it. If she seeks a destiny for herself, she will find it only on the ruins of all that was her raison d'etre."

These are profoundly European voices, the weight of 4,000 years of history pulling the spirit down below the surface of life. Forty years after the first 14 after the second, it is possible to add a coda.

America is suffering now; she is suffering greatly. Everything in the American spirit refuses the moment; but the moment will not be refused.

America is being born into history; this is what is meant when we read of the loss of American innocence; and, here and there among America's remarable breed of poets, one may hear a new American Voice responding to the moment:

"In this America, this wilderness Where the ax echoes with a lonely sound,

The generations labor to possess And grave by grave we civilize the ground."

This last elegiac line of Louis Simpson could never have been uttered by Walt Whitman; and in it, one can hear the fearful predictions of Ortega and Cioran being rehearsed.

I stood in line, late one evening, with an English colleague, to walk past the coffin of Dwight Eisenhower as it lay in the Bethlehem Chapel at the National Cathedral. It was my impression that we paused before it a little longer than most Americans: we were both old enough to remember when this rather decent man, this improbable crusader with the sword as a cross upon his shield, was the symbol of all the hope that remained in Europe.

My mind traveled further back, to the first cable sent by his predecessor, John J. Pershing, when he arrived in Paris in the early summer of 1917. He suggested to Washington that a million American soldiers would be needed. Only five days latter, he sent a second cable revising his estimate: preparatiions should be made to send three million men. As laconiic as a sentence from Caesar, those two cables summarized the moment at which America had arrived.

It was because that moment was refused in 1919 that Eisenhower had to follow Pershing a quarter of a century later, leading American men over the bones of their fathers into the heart of Europe; and the birth of America into history had begun.

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How certain of herself America was after 1945. She did indeed move greatly, a ship of state, to her destiny; accepting it. Even the intellectuals – vain weathervanes – were suddenly at one with their society, no longer emigres within it. There was never less alienation. It was the period – and how ironic it now seems – when the Fulbright Scholarships were established. Their message was clear: America would now educate Europe.

Had not the prophecy of Alexis de Tocqueville come true: that America would be the free, as Russia would be the absolutist, empire of the future, and that a titanic struggle for the spirit of man would take place between them? To all except the Communists – not least to the social democrats in Europe – America seemed to be a heroic nation at a heroic moment, possessing the virtues of command because she could command by her virtues.

Has it all passed, so soon?

It is as a European that I awake every morning to America, and graven on the mind of every European are the urgent words that cry from the pages of "The Brothers Karamazov," a Russian speaking from outside Europe as might an American.

"I want to travel to Europe, Aloysha, I shall set out from here. And yet I know that I am only going to a graveyard, but it's a most precious graveyard, that's what it is! Precious are the dead that lie there. . . ."

Among them now, inexpressibly precious, are the dead of two generations of Americans; and each year, the harvests of Europe are lifted from soil in which their blood is mingled. Mine is a stranger's vision of America, but their bones are beneath my feet.

SOUTH TO SELMA

I first came to America almost six years ago, at the same age as Columbus when he set out on his first voyage; a satisfying omen. It was the week of Selma, and I traveled slowly into the South that spring – with all due deliberate speed, one might say – taking almost three months to reach even Atlanta.

I wished the South to speak to me: not with one voice, for I do not believe that any people speaks with only one voice, but with its many voices. I wished to listen to its conversation rather than to ask it questions.

Some of my recollections are bizarre.

Late one afternoon at the beginning of May, I disembarked from a Greyhound bus at Camden, S.C., disheveled and dirty, to be met by a chauffeur black and liveried, standing by a Lincoln Continental, chocolate brown and only a little shorter than the bus. My Southern hostess for the coming week had invited most of the power structure of Camden to dinner that first evening so that I might meet them.

Before dinner. they were discussing the difficulties of finding good servants. "Of course," my hostess suddenly interrupted, *his* grandfather was *your* grandfather's slave. Wonderful family!" The word slipped by, only I, presumably, noticing it.

Later in the week, I was taken to meet another member of the power structure. When we came out, I said: "Is he a Klan member?" She looked at me sharply: "Why do you ask that?"

"Just as one can tell a Communist or a Jehovah's Witness by certain words and phrases which only a Communist or a Jehovah's Witness uses, so this man seemed to be using key words and phrases of the Klan."

"I had never thought of that. We must look into it. We don't want that sort of thing here." It was an aristocratic voice – like the voice that saved the English aristocracy in the 19th century – oblivious to the real depth of the social movements going on around her but determined that they should be gently guided; above all, that nothing awful should happen. The farther I pushed into the South, the more I missed it.

There is the old aristocracy of New Orleans, of course, living in large shabby mansions: "We have not had it done up since the war, you know," and they mean the Civil War. They exist on dwindling fixed incomes, and would not touch a credit card.

A Traitor's Relative

From such a background came one of my closest friends in America, until ast summer the Deputy Solicitor General, who for seven years fought most of the civil rights cases through the Supreme Court. His class regards him as a traitor, but it is worth listening to his great-aunt.

Tante Clarisse – the French influence in her character is important – is a grand old lady; she would be so in any class. When she still visited Washington, she traveled by train, and after the desegregation of the dining cars, refused to eat in them. Her nephew and his wife had therefore to pack snadwich meals for her.

"You mean you can't stand the f---ing niggers," an opprobrious Englishman said to her one evening. She turned to him with great calm and all of her 80 years: "That is not the point at all. I am simply not used to them at table."

But the particular moment to listen to her was when she upbraided her nephew for bringing himself – with

his name – to appear before the Supreme Court. "Oh, no, Louis, I'm not talking about their opinions; it is not they that bother me. It's those awful justices; none of them have any background. That little man – Mr. Black – has he a *family?"* It might have been Lady Bracknell speaking in "The Importance of Being Earnest."

The voice is haughty and disdainful, and vicious when it is power ful. But one must be very humorless if one does not respond to the manner: keeping up appearances even while conceding change; a class bowing itself out of history with hauteur.

I found it again – foolish and prattling this time – in Charleston, where I sat one evening on the veranda of a mansion which was falling apart, with three old ladies who were gently keeping pace with its dilapidation, the veils covering their faces like the Spanish moss hanging from the trees.

"Mr. Fairlie," one of them said, "have you –*have you* – read 'Gone With the Wind'?" I said that I had seen the film but not read the book. "Oh, but the film is nothing, Mr. Fairlie, you must read the book." I asked if it was really as important as that; the three of them answered in chorus. "It is all there, Mr. Fairlie, what the South is all about." I looked over my julep: "All?" The chorus was unanimous: "All, Mr. Fairlie, all."

One last recollection and I will have done with these bizarre survivals of the Old South. I was having lunch at another mansion, only half of it used, outside Richmond, the home of a cultivated and traveled man carrying a famous name; manoral crests on the walls of his house.

Three feet beyond the windows of the dining room there were a few little hummocks in the lawn, surrounded by a railing. I asked what they were. "The graves of our soldiers, where they fell, their names unknown," I was told.

As for Thomas Jefferson, he could not lift a glass of madeira without working out a theorem to prove that a Negro, if given the opportunity to be properly educated, could do it as efficiently. He simply did not give the Negro the opportunity.

We are told today that it is modern communications which account for the speed with which revolutionary ideas now travel. Yet the movement for American independence only seriously began after the end of the Seven Years Was in 1763, when the French had been bundled out of North America and the Americans correctly calculated that England could be bundled out, too. Within a mere 20 years – a short time, even for today – they had done it.

It is too often forgotten that the American Revolution was complete six years before the French Revolution began, and 20 years before Napoleon invoked the nationalist feelings of the peoples of Europe, always imposing on them the rulers he chose.

No more in 1776 than now was the Medium the Message. A great idea moves at its own speed; sometimes slowly, if its time has not yet arrived; sometimes like lightning, however slow the medium. There has been no stopping the Idea of 1776.

It can be done; it can be made; even a nation can be made. No other idea has so loosed the chains of things in the past 200 years. Communism and liberalism and democracy have proved to be local; only nationalism is universal.

'Hi!'

I believe that I have been living among a very great people for the past five years, and their greatness may be heard in the most common of their expressions, with which I have grown familiar but which I still do not use. It is theirs and not mine: "Hi!"

In England, it is still possible to fix a man in his proper station by the greeting that he uses and the manner in which he utters it. There is even a difference between "Hello!" and "Hallo!" and "Hullo!" I leave London Airport with a "Good afternoon, sir," from the customs officer, the line between him and me manned by these words; I arrive at Dulles Airport to be welcomed with a "Hi!" No line marked or acknowledged.

I go to the White House for my first interview with the President, and "HI!" says Bill Moyers to me. "Hi!" says the girl at the checkout counter of the supermarket. "Hi!" says the child playing on the sidewalk. "Hi!" says the attendant at the gas station. "Hi!" says the bartender. "Hi!" say the child playing on the sidewalk. "Hi!" say my American friends as they open their doors to me. "Hi!" said the Suffragan Bishop of Washington, as if it were a blessing.

The word is a democracy. Even after five years, I still notice it: this unaffected assertion day by day, and hour by hour, by all and sundry whom I encounter, that they are as I, and that I am as they, which in England would be considered preposterous.

This is not the manner in which I was raised, and sometimes the greeting irks me. But I have no doubt that, for better or for worse, the democratic instincts of this remarkable people are deep and genuine, and that this is their loftiness.

In fact, the Americans might understand their institutions better if they understood how important – and awkward, and unusual – a political fact it is that they are not a deferential people; for the most striking fact, to an outsider, is that they neither have much affection for nor take much pride in their institutions, and that this has been characteristic of their history.

They inaugurate a new President on a cold day in a drab month, and the cables of the microphone begin to smoke as an aged poet reads a faltering encomium, and the oath of office is administered in less than a minute; whereas in England the coronation of a monarch is always arranged for early summer so that the populace may be in the streets without unnatural discomfort and, feasting their eyes on the color, they love their queen.

Similarly, when Parliament reassembles each year, the sovereign in England drives there in a glittering coach, makes her speech from the throne and drives away again in a glittering coach, which no one suspects might turn into a pumpkin; and Parliament does not meet each day until the Lord Chancellor has made his robed procession, in one direction, to the Lords, and the Speaker has made his robed procession, in the other direction, to the Commons.

But when the new Congress of the United States meets this month, it will do so as a pumpkin; and the Senate slips into its seats each day after only a graceless prayer read by its chaplain, who makes up his own words.

For example, on Jan. 4, 1965:

"As this day, in a tapestry of words and phrases, in a time so tangled and tragic, the chief executive and his coadjutors sketch out a pattern of the nation's purpose as it is seen by them, may it be heard with a sympathetic realization of the vast global responsibilities, complications and commitments with which it deals. As the panorama of the nation's life passes before anxious eyes, may the chief legislators here highly resolve that this white-domed Capitol edifice shall be not only as arsenal of material might, but also a cathedral of religious faith where are proclaimed to all the earth the sanctions of irreversible moral force and the spiritual verities on which our freedoms were reared."

Or on Feb. 28, 1968:". . . may no concern for self nor ill will for others blur the goal of our glorious destiny among the nations as the instrument of Thy providence to free the earth of tyranny."

There is something to be said, perhaps, for an Established Church, and a Book of Common Prayer.

But there is one institution of the United States which has its ritual, maintains it and delights in it. At 9:55 a.m. on any day on which the Supreme Court is sitting, the junior clerks of the justices arrange their seats, and, having fussed a little, withdraw. The dark red curtains behind the justices' bench settle, and, at 10 a.m. exactly, the clerk of the court asks everyone present to stand. A moment later with one bound, nine old men in black robes leap through the dark red curtain – none has ever yet tripped – and appear to wait for applause.

The clerk of the court has already called "Oyez! Oyez!" – when one was expecting him to say "Hi!" – before he reads the prayer invoking the assistance of Almighty God in its deliverations. This is the court, one recalls, which ruled that prayers should not be said in public schools.

All the same, it is a masterful ritual, and it is said that the only profound objection which justices such as Hugo L. Black and William O. Douglas have to the prayer is that they doubt that there is a Supreme Being superior to the Supreme Court.

A Dearth of Dignity

But even this paraphernalia is not visible to a wider public. The serious work done by institutions is usually humdrum and usually invisible. The problem, therefore, is to make institutions visible, so that the people may become familiar with them, may enjoy them and may develop an affection for them.

It is for this reason, as Walter Bagehot pointed out, that the House of Commons has a dignified as well as an efficient aspect. But there is no dignified aspect of Congress, and very little, after the inauguration, of the presidency.

If the institutions of England are dignified, it is because the people of England, as Bagehot again said, are deferential, and this applies – the deference at least, if not the dignity – to European societies in general. American institutions, on the other hand, are not dignified because the American people are not deferential.

This can be alarming. A country with dignified institutions, supported by a deferential people, would not long have tolerated such a "man of the people" as Joe McCarthy; the institution, considering itself to be more than the people, would have crushed him.

Much is made of de Tocqueville's insight that a democratic people, such as the Americans, tend to be conformist. He would have come nearer the mark if he had more clearly noticed the lack of deference which is their democratic spirit.

All the same, when he came to America in the 1830s, it was because he believed that in America he would find the democratic spirit of the future; and he came almost half a century after his countrymen had raised the banner of "Liberté, Egalité, Fraternité." If he returned to earth today, he would no more look for the democratic spirit of the future in Russia or China than he did in France in his own time. He would embark again for America.

America was the first, and is still the only, great nation that genuinely means the words: "We, the people . . ."

But my vision must, for a moment, turn back on itself, because I believe that this is what the ideas which I have been discussing themselves do. I am aware of a persistent ambiguity in my attitude to America, and I believe that this in part reflects the persistent ambiguities that exist in the ideas within the Idea which is America.

Two lines of Herman Melville, in a poem about America, have increasingly struck me as I have lived in America:

"I know a wind in purpose strong –
It spins against the way it drives."

The emphasis is his; and one can have only a facile understanding of the difficulties of America at this moment, and will be merely banal in debating them, unless one recognizes the power of these contradictions within the ideas within its Idea.

Is the New World an entrance, as I have said, or a destination? It is a vital question. Entrance and destination are the twin symbols of the New World – felt most powerfully where the East River and the Hudson River join – the journey and the arrival, one and the same; indeed, the journey made, as with Columbus, at the point of departure, carrying the New World, as the immigrants ever since have done; and the arrival only the beginning of the journey that the New World must endlessly make to yet other points of departure, its only tradition, in the phrase of Harold Rosenberg, "the tradition of the new."

Unless one grasps the reality of this predicament, one can never understand the radical conflict in the attitude of the American people to their own country.

On the other hand, they see it as perfectly made, at a stroke of the pen, the true and the beautiful and the good, pristinely and forever; on the other, since no blemish must be permitted in this pristine perfection, it must continually be remade. The dilemma is real, and may be simply put: What does one do with a world which one proclaims as New, when it is in the process of becoming Old, except set about remaking it as New?

At the heart of the recurrent demands for a revival of America – a refreshing of her life, a greening of her land – is a perception of it as a once and future country. The attempt to resolve the paradox is a source of acute tension in its people.

The practical and inventive genius of the American people is similarly a source of unending restlessness. The belief that it can be done, it can be made, is translated into the belief that what has already been done or made can be immediately done or made better. In this view, politics itself becomes merely gadgetry.

It has often been said that the Americans are great joiners; I am more inclined to say that they are great tinkers. Indeed, they join to make the opportunity to tinker.

The very Idea of America itself – the very nationalism which made it – is at war, at home, with its proclaimed federalism, and abroad, with its position as a great international power; a source of both tension and restlessness.

All empires carry the seeds of ideas whose fruit eventually destroys them, but it is hard to think of any earlier empire which has carried, or any other empire which today carries, so contradictory an idea as nationalism. Yet the driving force that built the empire was this same idea, carrying it across a continent, east and west between two oceans, north and south between the tropics and the snows, to a position of world dominance.

A Power Transfer

But let me linger for a moment on the fourth of the ideas: the lack of deference, the democratic spirit, the tremendous power of "We, the people . . ." It is here that one can see most clearly the power of the contradictions within the Idea of America.

It is a commonplace that, where popular power is unfettered, the people tend to confer that power on politicians and officials of their choice at one election and then forget about it, until they confirm it or withdraw it at another election. They may bring pressure to bear on a congressman, they may protest against the actions of a President, they may lobby a department, but their power, as such, has been transferred from them, by themselves, by whatever electoral acts in which they have participated.

There is no other way in which "We, the people . . ." can participate; and the conservative critics

of democracy in the 19th century warned that this wholesale transference of power to strong executives must be democracy's inevitable result.

There is no scheme for what is today loosely and inaccurately called "participatory democracy" which is not an attack on democracy; which does not invite, as it is intended to invite, the participation of elites – of small and active numbers of people – in order to interrupt the direct ransference of power from "We, the people . . ." The idea of "participatory democracy" is in direct conflict with the idea of the Constitution.

Thus "We, the people . . ." are certainly more interested in highways than in conservation – the campaign to stop the building of the Three Sisters Bridge was a campaign by elites – and conservation generally, in spite of all the publicity, is an elite issue. But the various campaigns for "participatory democracy" are designed not to increase the participation of "We, the people . . ." who want highways, but of "We, the special people . . .," who do not want them.

There is no getting round this flaw in all democratic or nearly democratic constitutions – it exists in England as well as in America – but the flaw springs from the idea of democracy, from the American assertion that power springs from "We, the people . . .," who then proceed to confer it on a monarch.

Because of their ancient ways and the absence of any issues of critical importance in their public life, countries such as England will be able to continue amiably enough supplying small checks and balances to the popular will here and there. It is only in America, I believe, that a constitutional struggle of profound importance is about to begin: the first serious attempt in any great country to reverse the democratic spirit of the past 150 years; to pit against the direct transference of the popular will the direct participation of active elites; to energize the institutions of the country, old and new, as deliberate obstructions to the power of "We, the people . . ."

The reason why this will happen is that the elites are minorities, and that they have a common interest with what are usually known as the minority groups. Thus do the ideas within the Idea of America, restless and fertile of conflict, produce their own convulsions.

America can no more refuse the impact of the tremendous ideas out of which she was created than she can refuse the moment at which she has arrived in which she is being born into history. The two today coincide at the beginning of her own tremendous and historic epoch.

No Place to Slumber

The words of Ortega and Cioran are beginning to pale. No trials, no dissensions, no trials? It is an extraordinary remark, anyhow, the more one reflects on it, to come from a Spaniard who devoted much of his most passionate prose to lamenting the fact that his own country had been asleep for two centuries.

Indeed, although I would not know myself as a European if Spain did not sleep in my consciousness, I cannot leave it there. In one of his most memorable passages, Ortega described his beloved Cordoba as "one of those cities whose soil is saturated with historical memories. Under the present quiet and humble town sleeps what remains of six civilizations: Roman, Gothic, Arabic. Hebrew, Spanish of the classic and of the romantic periods."

He should have gone to Macon, Ga., and read the inscription on the Ocmulgee National Monument: "There have been seven civilizations on this spot." One up to America.

But, as I have tried to show, the essence of America – of the Idea that is America – is conflict; ideas are at war within her, and where ideas are at war, as Ortega himself would have admitted about Spain, a country does not slumber or daydream.

I do not think that either Ortega or Cioran ever roamed America, and it is no more evident from their writings that either ever roamed her literature or her history. It is a common European condition. I pick up my European newspapers and journals in Washington each week, and, as I read them, I get the impression that the rest of the world only gossips about America; hence, so many tragic and avoidable misapprehensions.

I return, therefore, to my own question. How is it that a country which has suffered from the beginning, whose history has been one of ordeal, in whose spirit is the essence of ideological and even spiritual conflict, has translated this experience into a mythology of "an uninterrupted good fortune"? The answer lies, I believe, profoundly in the ideas within the Idea of America which lie at the center of my vision of America.

A people who see their point of arrival as only another point of departure; whose only tradition is of the new; who believe that all can be done, and all can be made; who weirdly imagine that a nation can be scribbled into existence; who accord to "We, the people . . ." an extravagant right to make an unchecked transference of their power, is likely to be a people who will rewrite their past, day by day, and treat their calamities as only mistakes.

Once is future, so once can be made better. American fairy tale does not begin, "Once upon a time," but "Once upon tomorrow," and tomorrow is always another day. "Aw, hell, there's always more around the corner," but they now know there is not. For this is part of the innocence of America which has vanished, as America is born into history.

This Lucky Land

Until now, there has been only a claimed exemption from history. As Richard Chase has said again of Walt Whitman: "His sense of things in 'Democratic Vistas' is that history really ended at the inception of the Republic, and that from then on change would not be radical but would be merely a matter of gradual unfolding and realization.' That is not the voice of Louis Simpson or Robert Lowell.

My resistance to many of the opponents of the war in Vietnam – a rotten little war – is that they too often feel that they must argue, that they can only argue, from the old contention that America is specially blessed by Providence to escape historical tragedy. Listen to J. William Fulbright in 1945:

"America's responsibility to furnish leadership for this world springs from the fact that she has been the most fortunate nation in recorded history. A great and rich land, unequaled in the wealth of its minerals and in the fertility of its soils. was nature's contribution to that good fortune. But of far greater importance than the soil itself was the character of the people who came to this land from the countries of the Old World, and the fact that they brought with them a civilization of the highest order. . . As a nation, we are the beneficiary of countless centuries of struggle and suffering by other peoples for human freedom."

Listen to him, then, in 1966;

"America is the most fortunate of nations: fortunate in her rich territory; fortunate in having had a century of relative peace in which to develop that territory; fortunate in her diverse and talented population; fortunate in the institutions devised by the Founding Fathers, and in the wisdom of those who have adapted those institutions to a changing world."

It is his common starting point: in 1945, to advocate an activist foreign policy of world leadership; in 1968, to advocate a disengagement from what he had come to regard as a too activist foreign policy of world leadership. In both cases, his starting point was the conviction that the United States is a nation most blessed by Providence.

In 1945, he admitted that other peoples had struggled and suffered for countless centuries for human freedom, and that America was now their heirs. In 1966, he argued that America must avoid "Those fatal temptatipower which have ruined other great nations"; in other words, that America can avoid the struggle and the suffering. It is no wonder, when this is the widely heard voice of America, that men such as Ortega and Cioran draw their conclusions.

Whatever the end of the war in Vietnam, whatever the eventual response to it, America is now born into history, and cannot escape historical tragedy. If she understands this – but only if she understands it – she may do better than earlier nations.

Our Wet Feet

European time ended when Pershing landed in Europe in 1917. The clocks then stood still until 1944, when Eisenhower landed in Europe and American time began. It is likely to be convulsive, tragic, grand; and it will greatly enrich the human spirit.

"Sail on, O ship of state." The language of today is too ironic, too wry, too meek, for such an invocation. But I may substitute for it my favorite quotation from any American politician.

Absolutism, said Fisher Ames, the American conservative, meaning what we call totalitarianism today, "is like a great ship with all sails set. It sails majestically on, until it strikes a rock and sinks forever. Democracy is like a raft. It never sinks but, damn it, your feet are always in the water." America is entering a period when those who fear to get their feet wet will not be useful.

To which I may perhaps be permitted to add the stinging reply that Winston Churchill sent to the British ambassador to Greece during the events of 1944, when the latter complained abjectly that he felt as if he were sitting on the top of a volcano. "Where in the hell" went off Churchill's cabled reply, "do you expect to be sitting in times like these?"

To me, the times are merely a little safer than they might be because I can detect in America the virtues of command.

Epilogue: The Editor's

And now you know why this book has no chapters neatly packaged under "Heritage, Heredity, Happiness, etc.," for each subject is part and parcel of the other, elements of a compound, overlapping, intertwined, interrelated, welded together – even in literature – as an "ecosystem"

This awareness, we belive, is the greatest and most exciting story of any age of man. Some have had it through all centuries, as our "perspectives" illustrate. But their cries in the ever-diminishing wilderness have gone unheeded – until now they come back to us with the reverberation of deafening thunder.

Seeing, smelling, hearing, tasting, feeling is at last "believing," isn't it? The strength of the *"sixth sense"* is now being tested in man's final examination.

That's why "Education" in the title of this conference is in quotes. The hypothesis of the past has been found disastrously wanting. A new "education" must be invented. Invented? No – just *constructed* – for a great Architect eons ago produced an immutable set of blueprints – balanced in minute detail. Up to now earth's engineers have badly – maybe irreparably – misread them. Tomorrow follows now.

How long is tomorrow?

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FINAL PERSPECTIVE

"Thus conscience doth make cowards of us all. . .?

To be, or not to be: that is the question:
Whether 'tis nobler in the mind to suffer
The slings and arrows of outrageous fortune,
Or to take arms against a sea of troubles,
And by opposing end them? To die: to sleep;
No more; and, by a sleep to say we end
The heart-ache and the thousand natural shocks
That flesh is heir to, 'tis a consummation
Devoutly to be wish'd. To die, to sleep;
To sleep: perchance to dream: ay, there's the rub;
For in that sleep of death what dreams may come
When we have shuffled off this mortal coil,
Must give us pause. There's the respect
That makes calamity of so long life;
For who would bear the whips and scorns of time,
The oppressor's wrong, the proud man's contumely
The pangs of disprized love, the law's delay,
The insolence of office and the spurns
That patient merit of the unworthy takes,
When he himself might his quietus make
With a bare bodkin? Who would fardels bear,
To grunt and sweat under a weary life,
But that the dread of something after death,
The undiscover'd country from whose bourn
No traveller returns, puzzles the will
And makes us rather bear those ills we have,
Than fly to others that we know not of?
Thus conscience doth make cowards of us all,
And thus the native hue of resolution
Is sicklied o'er with the pale cast of thought,
And enterprises of great pith and moment
With this regard their currents turn awry,
And lose the name of action.

-William Shakespeare
1564 - 1616